COMPARATIVE STUDY OF MICRODEBRIDER AND CONVENTIONAL INSTRUMENTS IN ENDOSCOPIC SINUS SURGERY FOR SINONASAL POLYPOSIS

Dissertation submitted to

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In partial fulfillment of the degree of

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BRANCH - IV

M.S. OTORHINOLARYNGOLOGY

DEPARTMENT OF OTORHINOLARYNGOLOGY

KILPAUK MEDICAL COLLEGE

CHENNAI – 600010.

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CERTIFICATE

This is to certify that **Dr.V.C.Swarna Saravanan** postgraduate student (2011 – 2014) in the Department of Otorhinolaryngology, Government Kilpauk Medical College and Hospital, Chennai. Has done this dissertation titled " **COMPARATIVE STUDY OF MICRODEBRIDER AND CONVENTIONAL INSTRUMENTS IN ENDOSCOPIC SINUS SURGERY FOR SINONASAL POLYPOSIS"** under the direct guidance and supervision in partial fulfillment of the regulations laid down by the TamilNadu Dr. M. G. R. Medical University, Chennai,for M.S., Branch – IV Otorhinolaryngology Degree Examination.

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DECLARATION

I **Dr.V.C. Swarna Saravanan** solemnly declare that the dissertation titled "**COMPARATIVE STUDY OF MICRODEBRIDER AND CONVENTIONAL INSTRUMENTS IN ENDOSCOPIC SINUS SURGERY FOR SINONASAL POLYPOSIS** " is a bonafide work done by me at Government Kilpauk Medical College under the guidance and supervision of **Dr. G. Sankara Narayanan, M.S.,D.L.O.,DNB Professor and Head of Department of Otorhinolaryngology**

This dissertation is submitted to the Tamil Nadu DR. M.G.R. Medical University towards the partial fulfillment of the requirements of M.S. Branch - IV, **Otorhinolaryngology** degree examination.

Chennai

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The Proposal is APPROVED.

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CONTENTS

ABSTRACT

TITLE: Comparative study of microdebrider and conventional instruments in endoscopic sinus surgery for sinonasal polyposis

BACKGROUND AND OBJECTIVES:

Nasal polyposis is an inflammatory chronic disease of the upper respiratory tract of varied etiology. It is characterized by nasal obstruction, reduction in sense of smell, infection, and impaired quality of life. Endoscopy has enhanced the diagnosis and management of nasal polyps. The initial approach is medical management. Those who fail medical management, a surgery is essential to achieve sufficient ventilation and drainage of the affected sinuses by using either microdebrider or conventional instruments for functional endoscopic sinus surgery (FESS). The present study was undertaken to study and compare the microdebrider assisted endoscopic surgery and conventional methods using sinus endoscopes in the surgical management of nasal polyps at kilpauk medical college,kilpauk ,Chennai.

METHODS:

Fifty patients with sinonasal polyposis who failed medical therapy were included in the study. They were equally randomized into powered and conventional instruments groups. A subjective visual analogue scale (VAS), endoscopic examination, and coronal CT were done preoperatively. Intraoperatively, the

operative time, the surgical visibilty and amount of blood loss were rated and recorded. Postoperatively patients were followed up for a period of 6 months and VAS, edema,crusting,discharge,synechiae and recurrence were recorded.

RESULTS:

Both groups experienced a significant improvement in VAS .The operative time as well as the surgical conditions and visibility of the operative field ,amount of blood loss were significantly better in the debrider group.In the Post operative period synechiae formation was seen in 5 patients treated with conventional method. Post operatively synechiae formation had considerable statistically differencebetween two methods. The polyp recurred in 2 patient with conventional method and in one patient with debrider method. Significant statistically difference was in post intraoperative blood loss,time for surgery,visibility of surgical field between two methods.

CONCLUSION:

Powered endoscopic sinus surgery offers a better therapeutic approach for patients with sinonasal polyposis when compared to endoscopic surgery with the conventional instruments. It provides a bloodless operative field with better visualization for a more precise, less traumatic procedure with minimal intraoperative complications and shorter operative time.

Key Words: Microdebrider, Nasal polyposis, Endoscopic sinus surgery

INTRODUCTION

INTRODUCTION

Nasal polyposis is regarded as one form of chronic inflammation in the nose and sinuses, as a part of the spectrum of chronic rhinosinusitis. The prevalence rate of nasal polyposis is about 2 percent, it increases with age reaching a peak in those aged 50 years and older[1].

Nasal polyposis has been associated with different systemic and respiratory diseases such as cystic fibrosis, rhinitis, and asthma with or without aspirin sensitivity.[2]

Treatment options available for nasal polyp are medical poylpectomy conventional polypectomy ,endoscopic polypectomy,microdebrider assisted endoscopic sinus surgery.

Nasal polyps are treated either medically or surgically. The medical treatment for nasal polyposis is topical or systemic corticosteroids [3]. It is termed medical polypectomy, but along with the risk of systemic side effects of steroids, the polyp can recur . Endoscopic sinus surgery is the option for patients not responding to medical treatment [4]. Surgical options can be either polypectomy or functional endoscopic sinus surgery (FESS) by Messerklinger conventional method. In Conventional method the normal mucosa is also damaged . This causes increased bleeding , decreased visibility and may lead to complications . Conventional instruments

have suction in built in them, but they are bulky and get clogged repeatedly. Microdebriders have suction at the surgery site, so they have advantages of removing polyp without the need to remove the instrument. The continuous suction of blood from the field improved visualization and precision during surgery[5] . This is a prospective randomized controlled study to compare debrider assisted endoscopic sinus surgery and conventional instruments in the treatment of nasal polyposis.

AIMS AND OBJECTIVES

The present study is undertaken to study and compare the microdebrider assisted endoscopic surgery and conventional methods using sinus endoscopes in the surgical treatment of nasal polyposis. Intraoperatively, the time required for surgery, visibility, blood loss are to be compared. Postoperatively synechiae , recurrence, mucosal edema, discharge, crusting, scarring are to be compared. Preoperative and post operative Visual analogue score in both methods are to be compared.

REVIEW OF LITERATURE

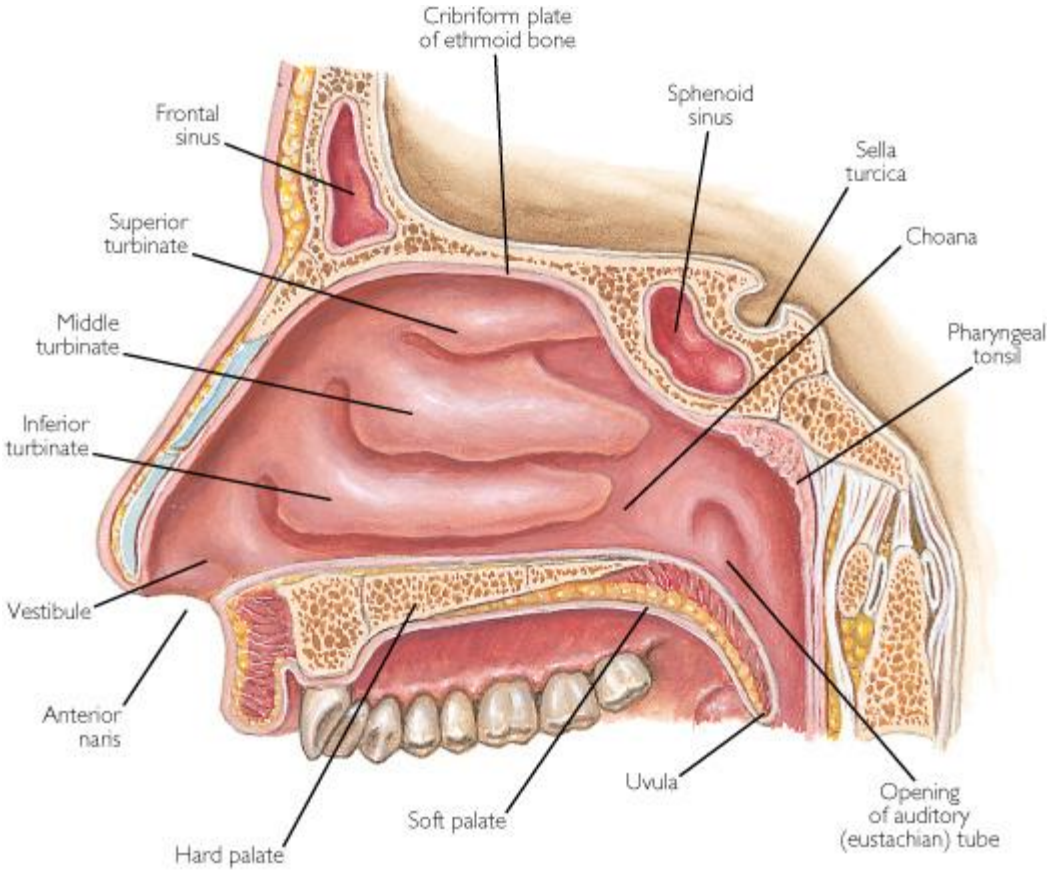
Anatomy of paranasal sinuses

The paranasal sinuses are cavities surrounding the nasal cavity and lying adjacent to orbit,brain and vital neural and vascular structures. There are three paired paranasal sinuses-maxillary,ethmoid, and frontal sinuses. One single sinus divided into two cavities, the sphenoid sinus.

Maxillary sinus: (Antrum of Highmore **)**

It is a pyramidal shaped sinus within the maxillary bone. It is the largest of the group of para nasal sinuses. First sinus to appear(7-10week). It measures 36×38×25mm.Adult volume is 15cm^3.The sinus is bounded superiorly by the orbital floor . The alveolar process of maxilla form the inferior boundary. The zygomatic process forms the lateral boundary. A posterior wall of bone divides the sinus from the infratemporal and pterygopalatine fossae posteriorly. The floor of the sinus will be usually 4 mm to 5mm below the floor of the nose in the adult. The natural ostium is seen in the superior one third of the medial wall of the maxillary sinus and drains into the hiatus semilunaris. The ostium is elliptical in shape measuring 1 mm and 20 mm in diameter .The ostium is seen behind the lower attachment of the uncinate process .

LATERAL WALL OF NOSE

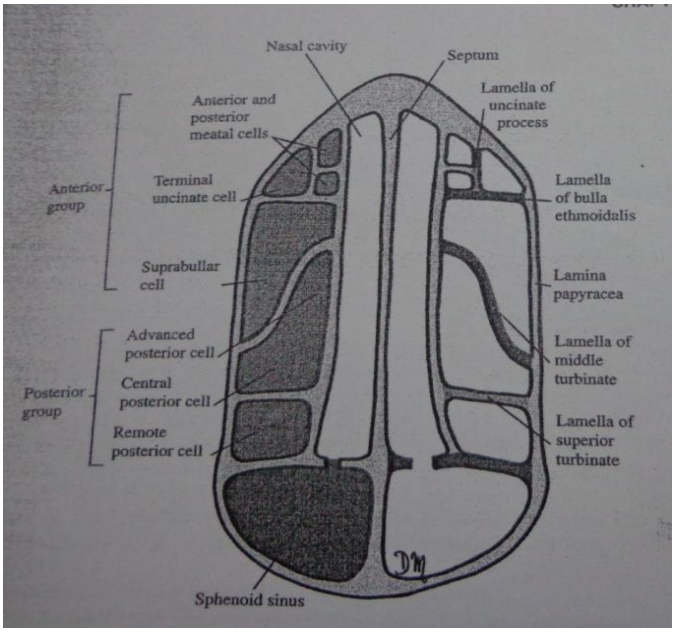


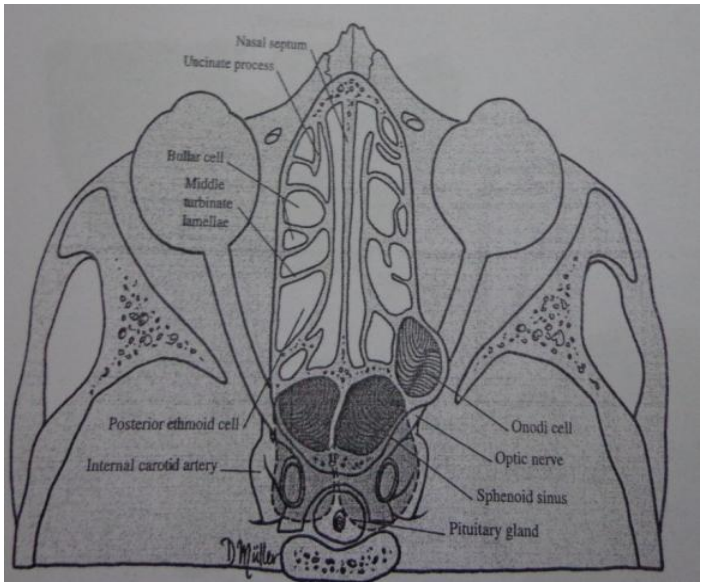
Ethmoid sinus

The ethmoid sinus is a group of cavities within the ethmoid bone . Ethmoid bone is unpaired and located in the median region above the level of the maxilla , between the floor of the anterior cranial fossa and the attachment of the uncinate process to the inferior turbinate .Ethmoid sinus is present at birth.

The roof is made of the lateral lamella of cribriform plate and frontal bone . This is called fovea ethmoidalis .The roof of ethmoid sinus slopes posteriorly .The junction between the frontal bone and the cribriform plate is the weakest area. The height between the lateral and medial roof is variable and measures from 1-17mm. The posterior part of the ethmoid cells is related to the sphenoid sinus. The lateral wall is related to the lamina papyracea of the orbit. Ethmoid cells are divided into anterior and posterior group. Combined volume of Posterior and anterior ethmoidal cells is 15 ml .

ETHMOID SINUSES





The basal lamella is posterior to anterior ethmoidal cells. The anterior ethmoidal cells drain into the middle meatus . The posterior ethmoid sinus is a collection of one to five cells that drain into the superior meatus. It is bounded anteriorly by the ground lamella , posteriorly by the anterior wall of the sphenoid sinus, laterally by the lamina papyracea, medially by the superior turbinate, and superiorly by the ethmoid roof.The behavior of the most posterior cells of the posterior ethmoidal sinus is of great importance in FESS. Onodi cell displaces the anterior wall of sphenoid sinus . In this situation the optic nerve surrounded by Onodi cell . To avoid injury, dissection should be medial and inferior. The internal carotid artery can seen on the lateral wall of the posterior ethmoidal cells.

Sphenoid sinus:

Sphenoid sinus is a set of paired , asymmetrical cavities lying within sphenoid bone. Recognised at around third intrauterine month. There is minimal development of the sphenoid sinus until 3 years of age. Sphenoid sinus are highly pneumatized and extend laterally. The sphenoid sinus measure 20×23×17 mm. The right and left sphenoid sinuses are separated by the intersinus septum. Occasionally this septum may be asymmetric. It usually deviates laterally and superiorly, inserting into the bony prominence over the optic nerve or internal carotid artery. Thus sphenoid septum manipulation should be done with caution to avoid visual or hemorrhagic

complications. The ostia of the sphenoid sinus are usually seen in the sphenoethmoidal recess. The ostia can be slit like, oval, or round in shape. The average distance from anterior nasal spine to the sphenoid ostium is 7 cm. The vidian nerve passes along the floor of the sphenoid. On the lateral wall, two bulges may be produced by the optic nerve and carotid artery; these bulges may be covered only by thin bone and in few cases are dehiscent.

Frontal recess and sinus:

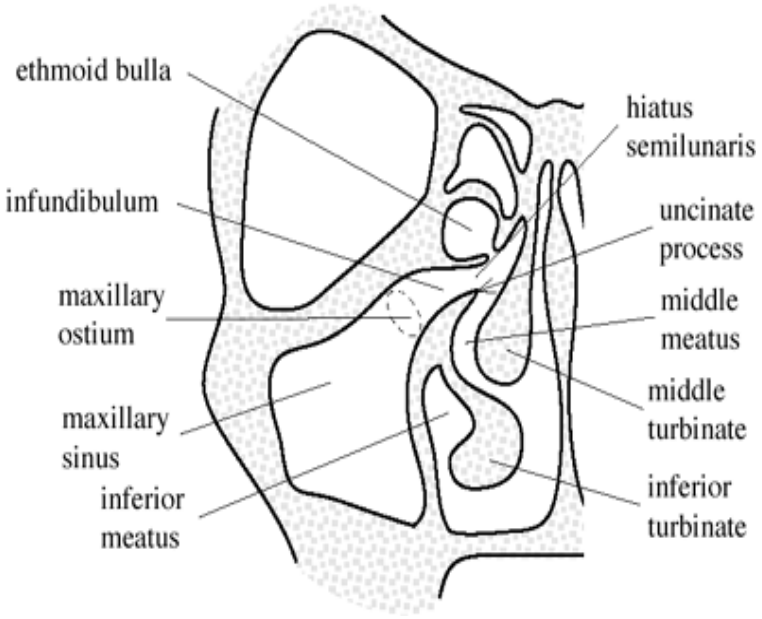
Frontal sinus is contained within frontal bone.Frontal sinus development begins in the fourth fetal month. Development is usually completed before 20 years of age. The adult sinus measures 28×24×20 mm and drains into the ostiomeatal unit through the nasofrontal duct . The frontal sinus is shaped like a funnel with its narrow end toward the duct ostium. The frontal sinus drainage has three segments the frontal infundibulum, frontal ostium ,frontal recess. This recess is bounded by the middle turbinate medially, the lamina papyracea laterally, the agger nasi anteriorly, and the ethmoid bulla posteriorly. The frontal ostium is usually found in the most anterosuperior part of the frontal recess. The ground lamella of the ethmoidal bulla is an important structure in relation to the frontal recess. It separates the frontal recess from the lateral sinus if the bulla lamella ascends to the roof of the ethmoid. Frequently the ethmiodal bulla lamella is incomplete, in which case the frontal recess

may communicate posteriorly with the lateral sinus. Depending on the position of the uncinate process, the frontal recess may open directly into the ethmoidal infundibulum or into the middle meatus medial to the uncinate process . Secretions from frontal sinus drain in to the middle meatus by passing medial and posterior to the agger nasi cell. The frontal recess can be narrowed, when agger nasi cells are pneumatized, this narrowing can predispose a patient to frontal sinusitis with minimal mucosal derangement.

OSTIOMEATAL COMPLEX

The ostiomeatal complex is a word coined by Naumann. This area is important for normal sinus functioning . This complex is bounded by the middle turbinate medially, the lamina papyracea laterally, and the basal lamella superiorly and posteriorly. The inferior and anterior borders of the ostiomeatal complex are open. The contents of this space are the bulla ethmoidalis and the anterior group of ethmoidal aircells, aggernasi, nasofrontal recess (frontal recess)and infundibulum. Any pathology in this area will disturb the physiology and can cause sinus dysfunction.

OSTEOMEATAL COMPLEX



Uncinate process:

The uncinate means hook like. It runs in a sickle-shaped curve from anterosuperior to posteroinferior. Its anatomy is better appreciated by medializing the middle turbinate. It is measures approximately 2 to 4 mm wide and 1 to 2 cm in length. The posterior margin is sharp and concave. It is anterior and parallel to the anterior surface of the ethmoid bulla. The hiatus semilunaris occupies the space between the uncinate and the anterior part of the ethmoid bulla. Uncinate is attached posteriorly and inferiorly, to the ethmoidal process of the inferior turbinate.The posterior-superior attachment is to the lamina perpendicularis of the palatine bone. The ascending anterior convex margin contacts the lateral nasal wall, which may extend up to the lacrimal bone. The uppermost segment of the uncinate process has variations. It is hidden by the insertion of the middle turbinate. It can extend to the base of the skull or turn laterally to insert into the lamina papyracea and may turn frontally and fuse with the insertion of the middle turbinate. Rarely, the uncinate can be pneumatized

Basal Lamella (Ground Lamella) of the Middle Turbinate

The basal lamella structure separates the anterior and posterior ethmoid cells. It runs in three different planes during its course. The anterior portion is vertical and inserts in to the skull base. The middle third is oblique and it is inserted to the lamina

papyracea. The final insertion to the perpendicular plate of palatine bone. The space under the middle turbinate is termed the middle meatus into which the anterior ethmoids, frontal sinus, and maxillary sinus drain. Surgical damage to the anterior or posterior portions of the middle turbinate may destabilize the middle turbinate and disruption of the cribiform plate.

Agger nasi cell

It is smooth swelling in frontal process of maxilla. It is in front of anterior attachment of middle turbinate. They can be 1 to 3 cells. The posterior wall forms the anterior wall of the frontal recess. The roof of the agger nasi forms the floor of the frontal sinus.Anterolateral to it nasolacrimal duct.

Ethmoid bulla*:*

The ethmoid bulla is the largest and most constant anterior ethmoid air cells. It is formed by the pneumatization of the bulla lamella. The ethmoid bulla is poorly developed or absent in few cases.It is located in the middle meatus, posterior to the uncinate process, and in anterior to the ground lamella of the middle turbinate. Superiorly, the anterior wall of the ethmoid bulla can extend to the skull base. If absent, there is direct communication between the frontal recess and the sinus lateralis. Posteriorly, the bulla fuses with the basal lamella. Variations are a highly pneumatized bulla lying in the lower aspect of the middle meatus. In this position,

the ethmoid bulla can narrow the infundibulum . So the frontal recess opens into the middle meatus medial to the ethmoidal infundibulum .

Sinuslateralis

The sinus lateralis is behind and above the ethmoid bulla. It is also called the suprabullar and retrobullar recesses. It is related to ethmoid roof superiorly, the lamina papyracea laterally, to ethmoid bulla roof and posterior wall inferiorly and anteriorly, and posteriorly the ground lamella of the middle turbinate.

Hiatus semilunaris:

The hiatus semilunaris is a two dimensional space .It is between the posterior border of the uncinate process and the ethmoid bulla. The middle meatus communicates with the infundibulum through hiatus semilunaris inferior. The hiatus semilunaris superior is the space between the posterior wall of the ethmoid bulla and the ground lamellae of the middle turbinate.

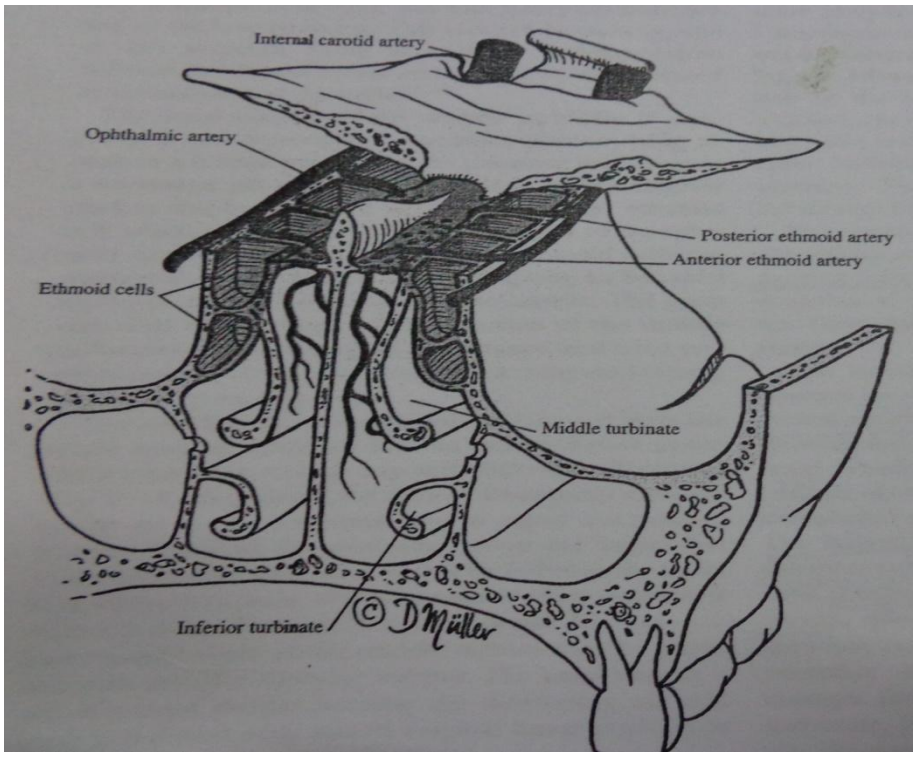
Ethmoid infundibulum

The ethmoid infundibulum is a funnel-shaped, three-dimensional space. Bounded medially by uncinate process ,laterally by lamina papyracea ,posteriorly by ethmoid bulla. Maxillary sinus, anterior ethmoid cells and frontal sinus drain into this space.

Anterior/Posterior Ethmoid Arteries

The anterior and posterior ethmoid arteries are branches of the ophthalmic artery . Anterior ethmoidal artery runs in three cavities. It is medial to superior oblique and medial rectus muscle and exits the orbit through anterior ethmoidal foramen. Then it enters ethmoid canal, here it crosses the ethmoid cells. It is within the bony canal or traverses in the roof of ethmoid.The artery then crosses olfactory fossa , where it give a meningeal branch. The artery then enter the nasal cavity through cribroethmoidal foramen and gives branches to upper part of nasal septum and lateral wall of nose and a final branch to dorsum of nose.The posterior ethmoidal artery crosses the medial rectus, exits orbit through the posterior ethmoidal foramen. It supplies the posterior ethmoid sinuses, terminal branches to posterior part of septum and lateral nasal. It is sometimes dehiscent . It is closely related to optic nerve in the orbital vertex.Their relation with the optic nerve and fovea remain constant.

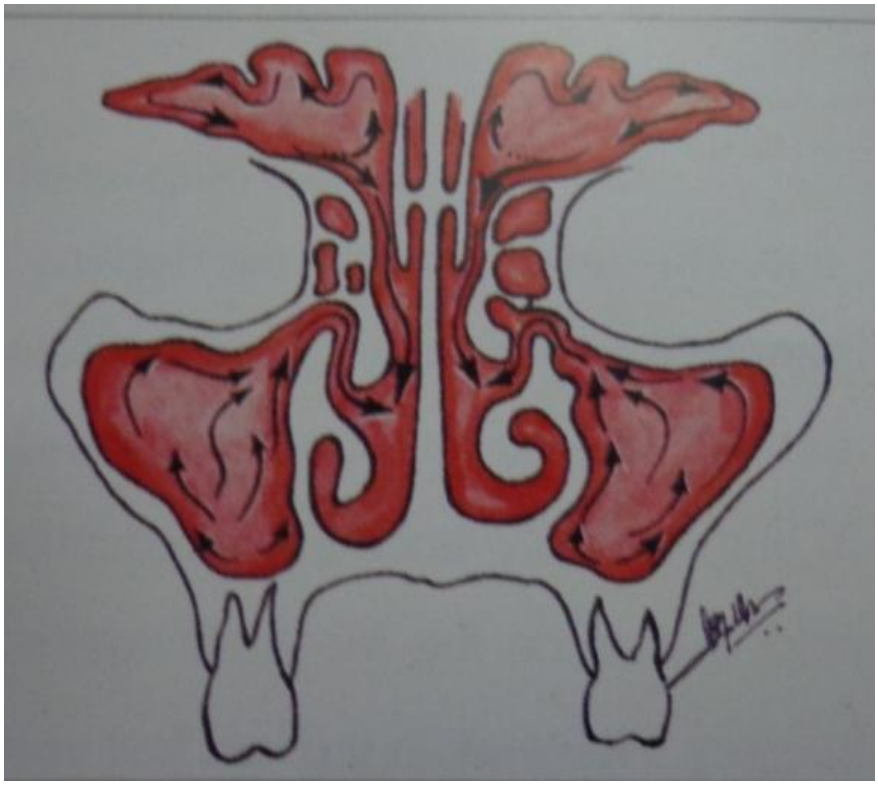
ANTERIOR AND POSTERIOR ETHMOIDAL ARTERY



SINUS FUNCTION

The functions of nose humidification of air, regulation of intranasal pressure , mucosal surface area increased, immune defense, lightening the skull, resonance to voice, shock absorption, and also development of face. The nasal and sinus mucosa is ciliated. The superficial layer of nasal mucosa traps bacteria and particulate matter . The inner sol layer produces substrate in which the cilia will beat.Usually mucous from the cavities drain through the ostia towards the choane.

SINUS DRAINAGE



HISTORY OF NASAL POLYPOSIS

Nasal polyposis has been reported in Egyptian books in 2,000 BC[6]. The name is derived from greek meaning many footed. During first century Celsus found that nasal polyps were due to change in climate.[7] Boerhaave(1744) thought that these growths arise from linings epithelium of the sinus membranes. Manne found that polyps arises when ducts of mucous glands that get obstructed. Frerichs and Billroth(1843) found that polyps are due to hypertrophy of nasal mucosa.[6]

A systematic investigation to find the causative agent started in the twentieth century. Kern and Shenck(1933) proposed allergy as a cause for polyp[8,9]. Vascular changes is due to sinusitis, periphlebitis, and obstruction to flow of mucus leading to passive congestion , edema, polyp formation.

Lurie (1959) suspected the link between cystic fibrosis and polyps . Triad of aspirin sensitivity, nasal polyps, and asthma is named after Samter(1969).[10]

HISTORY OF MEDICAL MANAGEMENT

Claudius Galen treated polyps with fat and also turpentine.[6] Hippocrates used nasal packs copper and honey to decrease the recurrence of polyps. Italian pharmacologist Daniel Bovet used antihistamines in 1930s. Antihistamines were used pre and post surgical treatment for polyps.

After the discovery of steroids the management of polyposis entered new era. Topical and systemic steroids were used for the treatment of nasal polyps (1970)[11,12] Oral steroids was used by Van Camp to reduce the size polyp [12] . Intranasal steroids are used in the treatment of nasal polyposis to reduce the size of polyps, recurrences and to avoid repeated surgery .

HISTORY OF NASAL POLYPOSIS SURGERY

Hippocrates identified several methods to remove polyp. One of his method was using a soft sponge. Hippocrates also used another method with crude snare, that avulsed the Polyps[6]. Aulus Cornelius Celsus, treated polyps with caustic materials, also separate the polyp from the bone using sharp instrument.[13] Fallopius was first to develop the snare. Fabricius introduced forceps first in 1600s for removal of polyp . In the eighteenth and nineteenth centuries many intranasal procedures were done. These procedures removed nasal mucosa and changed the surgical landmarks of paranasal sinus.[14]

Changes in sinonasal surgery came with the introduction of endoscopic sinus surgery (ESS). French urologist Antonin Jean Desormeaux coined the term endoscopy.German physician,Phillip Bozzini, was the first to develop endoscope, he named it as Lichtleiter(1805).[15]. First endoscopy to diagnose sinonasal disease was done by Hirshmann . In 1950, Karl Storz first introduced fiberoptic endoscope.[15]. But endoscope become popular in the diagnosis and surgical management of sinonasal diseases only in 1960s. Walter Messerklinger of Graz, Austria, introduced functional endoscopic sinus surgery (FESS) in Germany(1960s) and David Kennedy introduced FESS in the United States(1985).[16]

EPIDEMIOLOGY OF NASAL POLYPOSIS:

The prevalence of nasal polyposis in the population is estimated as 1–4%.[17,18]Although the male-to-female ratio is 2-4:1 in adults.[19,20]

The incidence of nasal polypi increases with age. Settipane noted that the incidence of polyp more in patients who are 50 years and above. Asthmatics over 40 years of age are four times more prone to have nasal polypi than those below 40years.

The incidence of nasal polyp is 0.1 to 0.2% in patient below 16 years of age.If nasal polypi are found in a child, then suspect cystic fibrosis.

PATHOPHYSIOLOGY OF NASAL POLYPOSIS

Polyp is defined as edematous hypertrophied prolapsed mucosa. Etiology for Nasal polyps are a multifactorial. It can be infectious, noninfectious inflammation, anatomic variations and genetic changes. All theories of polyps conclude that polyp is a final out come of chronic inflammation.

ALLERGY:

Allergy as a cause is due to three reasons . The most of nasal polyps have nasal findings that resemble allergic symptoms and signs, eosinophilia, association with asthma. In respiratory allergy, airborne allergens, plays a important role in the pathogenesis of nasal polyposis, The allergy causes chronic inflammation of the nasal mucosa.[21]Polyps is also associated with non atopic disease than with atopic disease. [22]

MUCOSAL ALLERGY:

Non atopic patient have IgE mediated localized disease of the nose. The IgE mediated nasal mucosal allergy is seen in 19% of patients ,with no systemic allergy[23]. Nasal polyps are also seen in systemic disease. The eosinophils dominate not only in the localized area of nasal mucosa, but present in the entire respiratory tract.

BERNOUILLI PHENOMENON:

The Bernouilli phenomenon is due to pressure drop in the vicinity of constriction. The decrease in pressure causes the inflamed nasal mucosa to prolapse into the nasal cavity leading to the formation of polyp[24] . This phenomenon is not seen in nasal valve region.

BERNSTEIN THEORY:

In this theory, inflammatory changes are seen in the lateral nasal wall or sinus mucosa after viral infection or secondary to turbulence in air flow. Polyps arise from contact areas of the middle meatus, that create turbulent airflow, along with constriction due to mucosal inflammation. A polyp can arise from the nasal mucosa due inflammation of the epithelial cells, endothelial cells, and fibroblasts affects, causing changes in the sodium channels at the luminal surface of the epithelial cell. This increases sodium absorption, water retention and polyp formation.[25]

EPITHELIAL RUPTURE THEORY:

In this epithelium of nasal mucosa ruptures due to allergy and infection. This ruptured mucosa, prolapses forming polyp. The ruptured epithelium is enlarged by gravity or obstruction to venous drainage. Electron microscopy studies showed that the polyps epithelium intact.[26]

VASOMOTOR IMBALANCE

This theory states that nasal polyps are not due to atopy or allergy. Patients have a prodromal period of rhinitis before polyp was diagnosed . Nasal polyps often has a poor vascular supply and vasoconstrictor innervations.[27] The increased vascular permeability causes edema and polyps formation.

ASPIRIN INTOLERANCE:

Samter's triad is characterized by the rhinitis and asthma attacks by aspirin or any anti inflammatory drugs and polyp formation. Rhinitis is persistent at around 30 years of age, then asthma, aspirin intolerance, and nasal polyps. In patients with aspirin intolerance, cyclooxygenase reponse is altered . Arachidonic acid metabolism is shunted. This decreases the levels of PGE2. This leads to chronic inflammation.[27]

CYSTIC FIBROSIS:

Cystic fibrosis is caused by mutations in chromosome 7, namely cystic fibrosis transmembrane regulator gene (CFTR).[28] The cyclic AMP-regulated chloride channel is absent. This result in chloride impermeability and increased sodium absorption.[29] This leads to water entry in to cell and interstitial space, leading to water retention, polyps formation .

Primary ciliary dyskinesia is characterized by chronic rhinosinusitis, situs inversus and bronchiectasis. Defects in the dynein arms of cilia is the primary cause for the immotility. Microtubular transposition changes and radial spoke defects have been identified[30].

Churg Strauss syndrome is a systemic vasculitis of small to medium sized vessels and is with with allergic rhinitis and chronic rhinosinusitis with nasal polyposis.[31]

YOUNG SYNDROME

Young syndrome consist of recurrent respiratory disease,chronic sinusitis,nasal polyp brochiectasis and azoospermia .The cause is unknown.

NITROUS OXIDE

In the respiratory mucosa, nitric oxide (NO) synthases is found in ciliated epithelium.They provide antimicrobial activity and controls cillary beat. NO also causes recruitment of inflammatory cells, inhibits apotosis of eosinophils.Nitrous oxide disturbs architecture of extracellular matrix, and causes extravascular leakage with consequent edema.[32]

INFECTION

The role of infection is important in the formation of polyp . In experimental models, epithelial disruptions with granulation tissue have been caused by Staphylococcus aureus, Streptococcus pneumoniae, or Bacteroides fragilis. In cystic fibrosis Pseudomonas aeruginosa is seen. The role of granulomatous polyps on nasal polyposis formation in human is not known.

THE MICROENVIRONMENTAL THEORY :

The constitutive cells of of nasal polyp produce inflammatory cytokines . These cytokines upregulate the receptors in vascular endothelium and also the integrins on the inflammatory cells .The eosinophils migrate to the nasal polyp and release more mediators . This in turn causes release of basic granule protein . The major basic protein has effect on mucus production and ion influx leading to edema that is seen in nasal polyp.[34]

FUNGAL INFECTION

Fungi are ubiquitous in a habitate. The fungal elements inhaled are trapped in the sinonasal mucus. The Eosinophils forms a cluster around the fungal elements.In this process, the toxic mediators released cause secondary mucosal inflammation. Fungal

elements are present in 82% of histopathological specimen.In a study mucus specimens from chronic rhinosinusitis patients showed cultures positive for fungi, but also present in healthy individuals.These shows the fungal colonization of the nose and paranasal sinus. Thus fungal elements as a causative agents of chronic rhinosinusitis with nasal polyps is uncertain.[35]

CHEMICAL MEDIATORS:

Apart from inflammatory cells , increased cytokines and chemokines have been identified in nasal polyps. Histamine are increased in nasal polyposis. The Th1 and Th2 type cytokines are elevated atopic status. The granulocyte/ macrophage colony-stimulating factor, eotaxin, RANTES, interleukin-5 can cause migration of eosinophils, interleukin -8 can provoke neutrophil infiltration. Vascular endothelial growth factor can increase angiogenesis in nasal polyposis. The IgE and IgA are also increased in nasal polyps. The local production of IgE can cause recurrence of nasal polyp through the IgE-mast cell-Fc RI pathway .[27]

Thus nasal polyps have multiple etiologic factors. Many theories believe polyps are expression of chronic inflammation.

CLINICAL PRESENTATION

Rhinosinusitis (including nasal polyps) is defined as: Inflammation of the nose and the paranasal sinuses characterised by two or more symptoms, one of which should be either nasal blockage/obstruction/congestion or nasal discharge , ± facial pain/pressure, ± reduction or loss of smell. All this symptoms for more than 12 weeks.

DIAGNOSIS:

ANTERIOR RHINOSCOPY

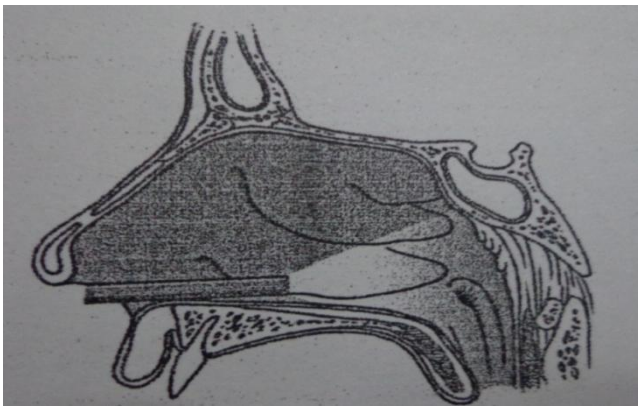
Anterior rhinoscopy is the first step in examining a patient with these diseases.

DIAGNOSTIC NASAL ENDOSCOPY

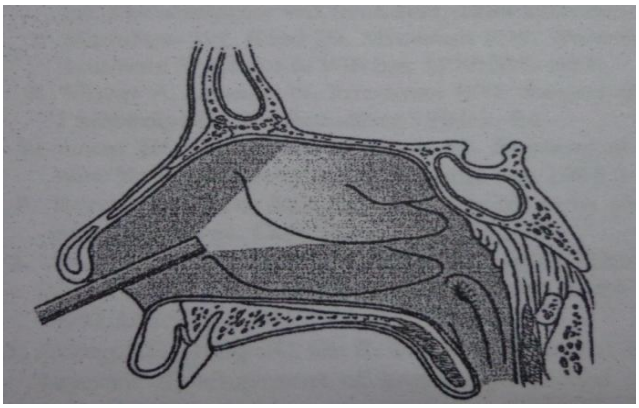
The first pass of the scope is along the nasal cavity floor and into the nasopharynx, allowing for examination of the inferior meatus and turbinate.

A second pass is made between the middle and inferior turbinates,to examine the middle meatus ,fontanelles for accessory ostia. Then the scope is rolled medially to visualize the spheno ethmoidal recess, to see the sphenoid sinus ostium.

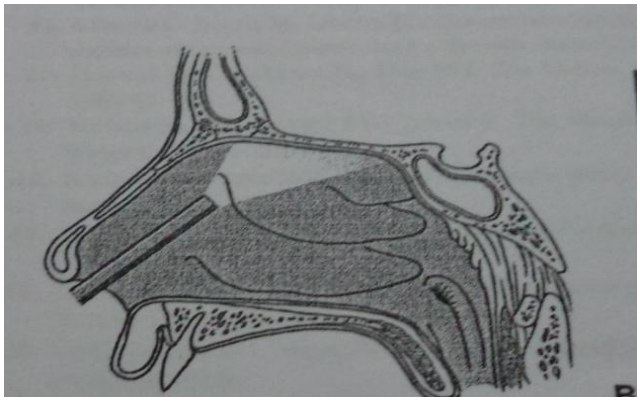
DIAGNOSTIC NASAL ENDOSCOPY



FIRST PASS



SECOND PASS



THIRD PASS

The Third pass is made as the scope is withdrawn. The infundibulum, uncinate, and the ethmoidal bulla are examined.

COMPUTED TOMOGRAPHY

Computed tomography scans of the paranasal sinuses should be performed 4 to 6 weeks after medical treatment . Although 3mm coronal images are most helpful to the surgeon for anatomic evaluation, the axial scan provides complementary information of the frontal recess and sphenoid sinus. Preoperatively, several anatomic features are examined on CT.

DIFFERENTIAL DIAGNOSIS:

The following diseases should be excluded from the diagnosis:

1. Non-invasive fungal balls, allergic fungal sinusitis and invasive fungal disease

2. Systemic vasculitic and granulomatous diseases

3. Inverted papilloma and malignant tumours

4. Meningocoele in a child presenting with nasal polyp.

5. Hypertrophied turbinate in a patient with allergic rhinitis

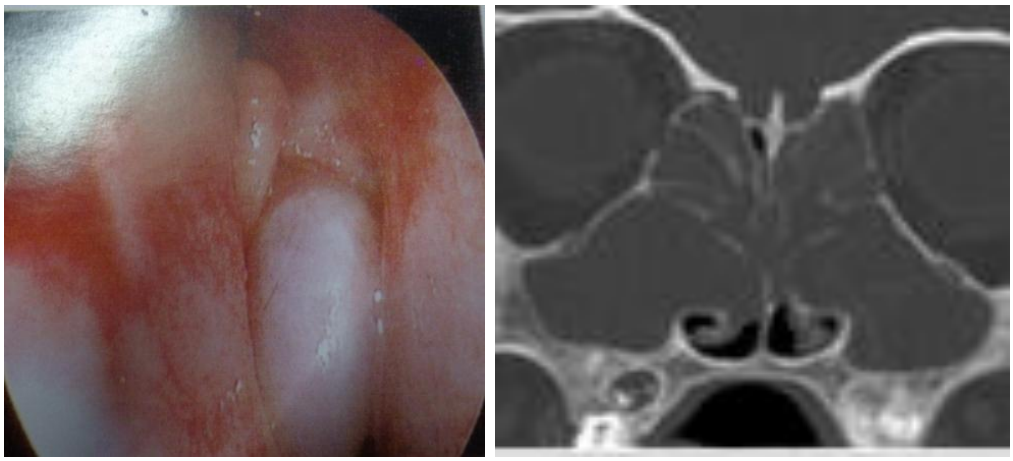
6. Cystic fibrosis based on a positive sweat test or DNA mutation

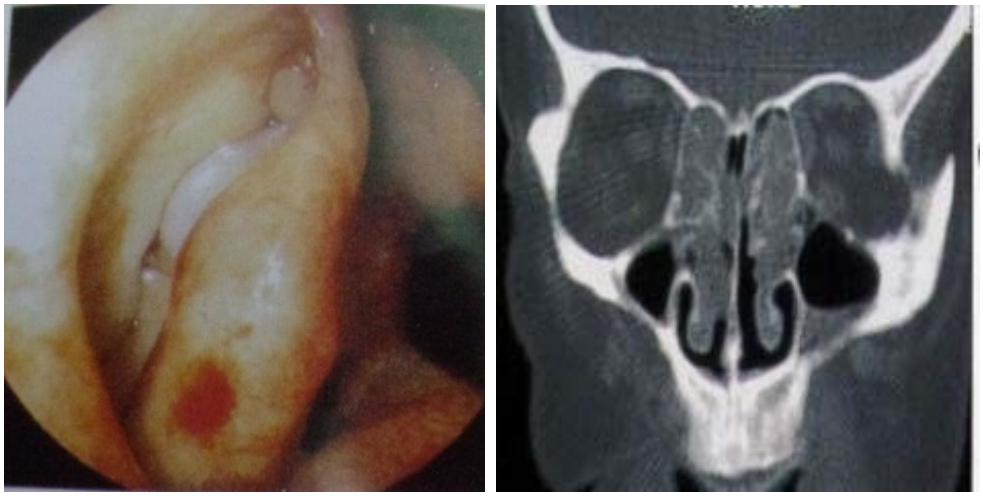
7. Gross immunodeficiency (congenital or acquired)

8. Congenital mucociliary problems such as PCD

.

DIAGNOSTIC NASAL ENDOSCOPY AND COMPUTED TOMOGRAPHY PICTURE

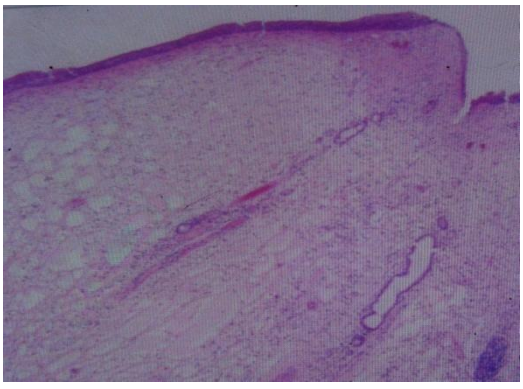




HISTOPATHOLOGY OF POLYP

MACROSCOPIC APPEARANCE : The polyps are grayish white in colour,smooth and glistening with a soft consistency compared to the adjacent normal mucosa.The cut surface is usually pale, translucent ,edematous .

MICROSCOPIC APPEARANCE : Nasal polyps are typically lined by respiratory epithelium and have a basement membrane with variable thickness and an underlying stroma and inflammatory cells.

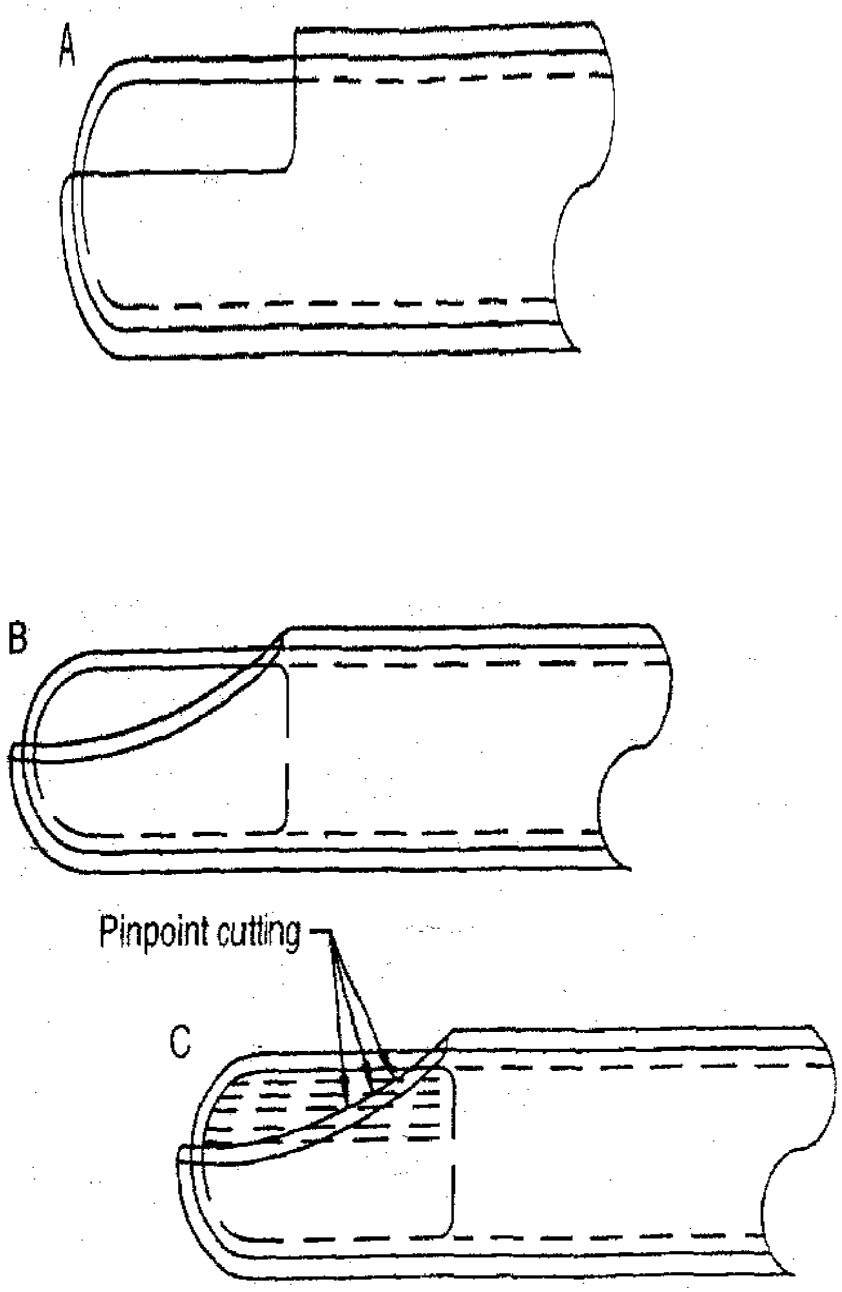


HISTORY OF MICRODEBRIDER

The devices were used by the House group in the 1970s for acoustic neuroma excision. The original patent was held by Jack Urban.[36] In 1970s, orthopedic surgeons developed a microdebrider that was became used in arthroscopy . Setliff introduced debriders in Functional Endoscopic Sinus surgery in 1994.[37,38]

MECHANISM OF MICRODEBRIDER

The microdebrider is a powered instrument that specifically resects tissue, minimal mucosal trauma and stripping. The term powered instrumentation refers to motor driven instrument that delivers suction and cutting action simultaneously.[36] The complete surgical unit consists of a power unit and its Foot switch or pedal, a hand piece and a disposable blade.The blade (cannula) is made up of two parts an outer blunt tip with a lateral port and inner cannula also has a lateral port. The inner tube oscillates, and the outer tube is stationary. The inner blade oscillate in reverse or



The outer and inner cannula may be configured to resect tissueby a guillotiiie cut (A) or scissors cut (B). Scissors cutting ismore efficient becauseit involves a"pinpoint cutting" action witha traveling plane of resection .

forward direction. The oscillating mode is, preferred which produced less pulling and tearing of tissue and subsequently causes less trauma.[39]

The actual clearance or fit between the inner and the outer tube assemble must be close (0.05 mm) is critical to obtaining the clean cut. Edges of blades may be smooth or serrated .

Microdebrider depends on shearing forces to resect tissues. Serrated edges are effective in cutting soft tissue than the continuos edges.The angle of the inner and outer blades produce either guillotine or scissor type of cutting . Guillotine type is less efficient than scissor cutting. Scissor cutting allows pinpoint cutting.[36]

Oscillation typically yields a better cutting, faster removal of soft tissue than does rotation and minimizes pulling. Smaller diameter blades are more aggressive than larger diameter blades.The speed of hand piece motor is 500rpm.

Force = torque/radius = torque/diameter/2 = 2(torque)/diameter

Burr of various size are available. The selection of burr depends on diameter, geometry (e.g., spherical, acorn-shaped), the speed of rotation, the number of flutes, rake angle and helix.

Suction part is provided in proximal end of the hand piece. Proper suction is must for effective use of microdebrider .Clogging of blades is prevented by placing in saline after the blade is removed from surgical field.[36]

OTHER USES OF MICRODEBRIDER

1. In Endoscopic Dacroystorhinostomy

2. In frontal sinus surgeries

3. In trans sphenoid pituitary surgeries

4. In Endoscopic skull base surgeries

5.Optic nerve decompression,

6.Traumatic optic neuropathy

7.Graves ophthalmopathy

8.Orbital decompression

9. Airway Surgery

10.Power assisted adenoidectomy

11.Intracapsular partial tonsillectomy

LIMITATIONS OF MICRODEBRIDERS:

1. Slow rotation rates – Debriders rotate at slow rates as compared to that of microdrills thus making it inefficient to drill bony structures.

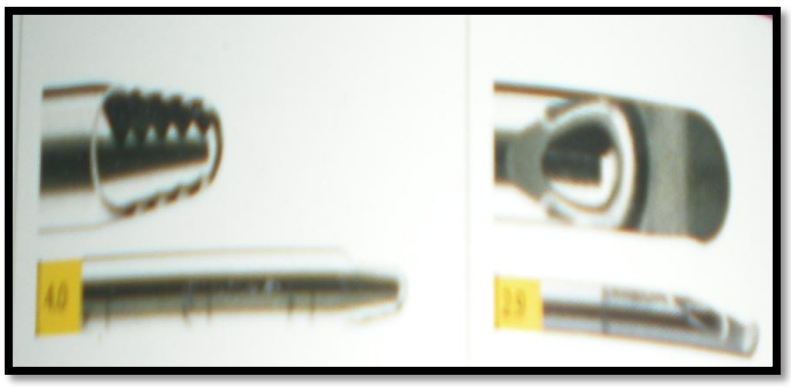
2. Tactile feedback is less while operating with microdebriders when compared to that of conventional instruments

3. It should be used carefully in confined spaces close to vital structures in order to avoid damage to them.

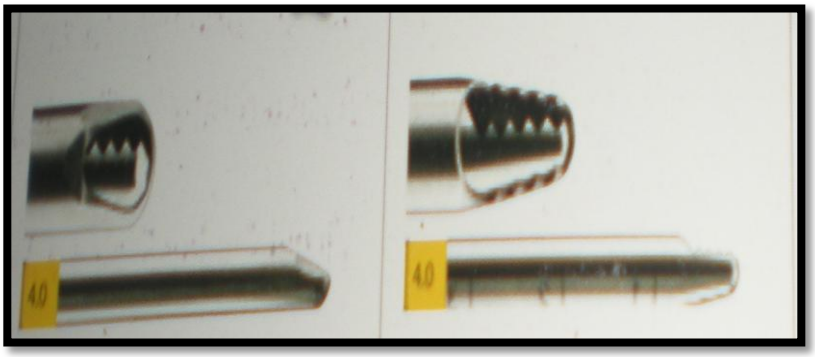
4. Initial cost of equipment and recurring expenses incurred towards purchase of blades increase the cost of surgery.[40]

MICRODEBRIDER SET

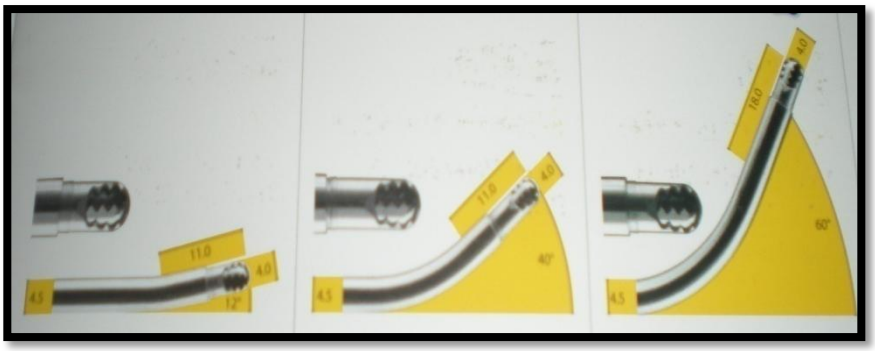
INFERIOR TURBINATE BLADE



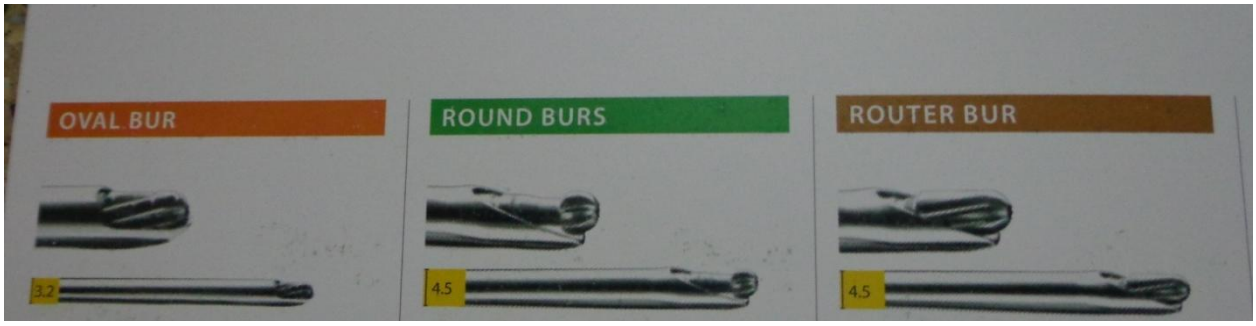
STRAIGHT SINUS BLADE



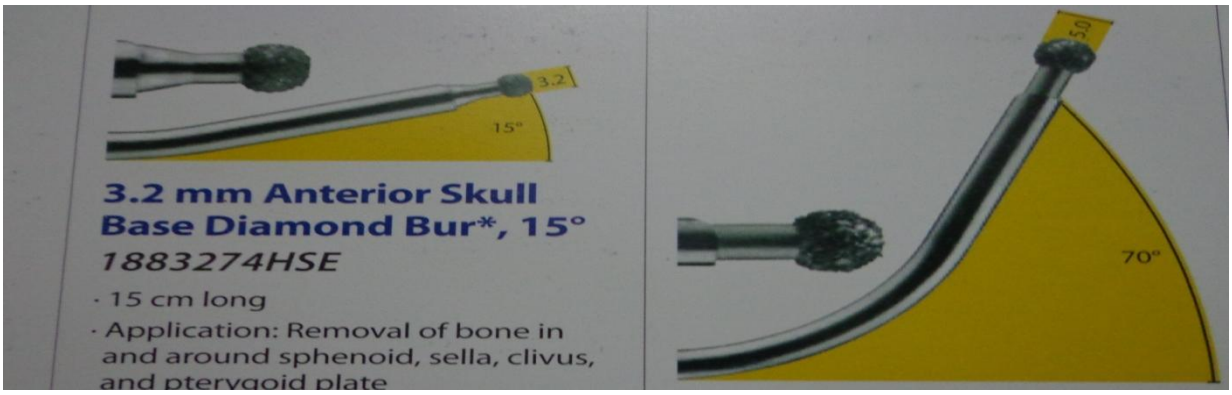
CURVED BLADES



STRAIGHT BURR



CURVED BURR



CONVENTIONAL ENDOSCOPIC SINUS SURGERY INSTRUMENTS

TECHNIQUE

UNCINECTOMY AND MAXILLARY SINUSOTOMY

The uncinate process is removed at the site of attachment by using cutting forceps.Uncinate process is divided superior and inferior parts with small backbiter and removed with microdebrider.[41]

If there is disease within the maxillary sinus or if the maxillary ostium is judged to be inadequate then the ostium can easily be enlarged into an antrostomy with the shaver. First, a mucosal edge must be created so that the shaver tip can engage. The natural ostium is enlarged in a posteroinferior direction. An ideal tool for this is a ball tip probe with a sharp edge on the outer surface of the curve of the probe tip . The ostium is engaged with the probe, and the sharp edge is used to incise the mucosa of the ostium in a posteroinferior direction. The shaver tip is then used to engage the mucosal edge and enlarge the antrostomy posteriorly and inferiorly. Little mucosal stripping occurs with this technique, and the antrostomy heals rapidly.

ETHMOID SINUSOTOMY

The shaver is used for ethmoidectomy. This instrument can be used to perform anterior or complete ethmoidectomy quickly, clearly, and safely without stripping mucosa . The blood loss using the instrument for ethmoidectomy is minimal. The ethmoid bulla

is penetrated with the shaver tip. Then, the bulla mucosal edge is engaged with the shaver cutting tip, precisely resecting ethmoid mucosa and bony lamellae. The posterior ethmoid is entered through the basal lamella and complete ethmoidectomy can be performed with preservation of mucosa .Safe ethmoidectomy can be performed with this instrument because the field is bloodless, because the instrument has benign contours with a blunt tip and cutting action at the side port rather than at the tip, and because the instrument is used parallel to the skull base and lamina papyracea. With the 4.2-mm shaver tip,bony ethmoid lamella can be removed easily. Care should be taken to avoid lateral dissection in the posterior ethmoid to prevent injury to the optic nerve. The goal of achieving a mucosal-lined ethmoid cavity with minimal bone exposure is easily attainable with microdebrider.[43]

SPHENOID SINUSOTOMY

The sphenoid sinus can be entered with the soft-tissue shaver either through the anterior ethmoid or transnasally through the anterior face. When proceeding to the posterior ethmoid cells, the sphenoid sinus can be approached through the medial inferior portion of these sinuses. When proceeding in the other direction, the superior turbinate is seen as a ridge along the face of the sphenoid. The ridge can be fractured medially with the shaver, exposing the sphenoid ostium. The ostium can then be

enlarged circumferentially with the microdebrider. Blindly placing any instrument deep within the sphenoid sinus must be avoided to prevent injury to the optic nerve or internal carotid artery.[43]

FRONTALSINUSOTOMY

Before working in the region of frontal sinus, the position of related structures ,such as the skull base and anterior ethmoidal artery should be ascertained . The anterior ethmoidal artery lies posteroinferior to the dome of the ethmoid , typically it lies posterior to the supraorbital ethmoidal cells. The position of frontal sinus ostium is variable, most commonly located medially, frontal sinus can be displaced posteriorly. The frontal sinusitis due to infundibular disease,the opening is displaced medially. When disease secondary to agger nasi inflammation frontal sinus opening is displaced to posteriorly. To identify the site of opening small seeker or frontal recess curette used . Once the opening is identified roof of agger nasi fractured anteriorly or medially. This is called “uncapping of egg”.Avoid injury to the mucosa of internal ostium of frontal sinus. When there is osteitic bony partition it has to be removed using cutting forceps and frontal sinus opening widened. In general opening of at least 4 to 5mm is ideal to avoid future stenosis[44]. Draf studied using a drill, to access the frontal sinus. The drill is available with a protective sheath and suction at the surgical site. The beveled sheath protects the mucosa of the posterior table . It has also enabled us to achieve a wide sinus opening.[35]

MATERIALS AND METHODS

STUDY DESIGN

This was a prospective randomised controlled study.

STUDY AREA AND STUDY PERIOD

The study was conducted on 50 patients visiting ENT OPD at kilpauk medical college and Hospital, Chennai prospectively during the time period of 1 year from november 2012 to november 2013.

INCLUSION CRITERIA

1.12-60 years of Age

2.All Patients suffering from sinonasal Polyposis

EXCLUSION CRITERIA

1.Age below 12years

2.Patient medically unfit

The exclusion criteria included patients

a)who were pregnant or lactating

b) who did not give consent for the study

c)who were not able to tolerate general anesthesia due to medical circumstances

d) who had a history of previous sinus surgery

METHOD OF COLLECTION OF DATA

Patients who agreed to randomization were consented, included in the study and started on medical treatment with systemic steroids for 2 weeks and a topical nasal steroid one month. Patients in whom disease persisted after medical therapy were equally randomized into two groups- microdebrider and conventional endoscopic sinus surgery method with 50 patients in each group. A visual analogue scale (VAS) was done on every patient to assess the severity and impact of symptoms for, nasal discharge, olfactory disturbance, nasal blockage , headache ,facial pain. VAS was ranging from 0 cm for symptoms not troublesome at all to 10 cm for the worst imaginable level.

DIAGNOSTIC NASAL ENDOSCOPY & GRADING OF SINONASAL POLYPS

Nasal examination including diagnostic nasal endoscopy was done in all cases. Results were graded according to the extent of invasion of polyps. They were

Stage 1 extending to the middle meatus.

Stage 2 extending to areas beyond the middle conchae without reaching the floor of the nasal passage.

Stage 3 extending through the entire nasal passage.

Mackay and Lund endoscopic score was also used to grade nasal polyps which involves meticulous endoscopic study of nose and paranasal sinuses.

1. Presence of polyp on left side – (0,1,2,3)

2. Presence of polyp on right side – (0,1,2,3)

3. Edema left (0,1,2)

4. Edema right (0,1,2)

5. Discharge left (0,1,2)

6. Discharge right (0,1,2)

0-Absence of polyps;1-polyps in middle meatus only; 2-polyps beyond middle meatus but not blocking the nose completely; 3-polyps completely obstructing the nose.

Oedema: 0-absent; 1-mild; 2-severe.

Discharge: 0-no discharge; 1-clear, thin discharge; 2-thick, purulent discharge.

A preoperative CT scan of paranasal sinuses was done in all patients.

The Lund and Mackay staging system for radiological staging was applied. This scoring system consists of a scale of 0-2 dependent on the absence, partial or complete opacification of the sinus system and the ostiomeatal complex. This scoring system derives a maximum score of 12 per side.

Table 2 illustrating radiological Lund Mackay scoring system:

Sinus system	Right	Left
Maxillary (0,1,2)		
Anterior ethmoid (0,1,2)		
Posterior ethmoid (0,1,2)		
Sphenoid (0,1,2)		

Frontal (0,1,2)

Ostiomeatal complex (0or2)

Total

Operative procedure:

Patients underwent operative procedure under general anaesthesia. The microdebrider (MICRO XPS-MEDTRONICS) was utilised for surgery. The procedure was done by the microdebrider. Polypectomy, uncinectomy, middle meatal antrostomy, anterior and posterior ethmoidectomy, sphenoidectomy and frontal recesss cleared according to the disease extent. Cutting blades rpm was set at 3,000 in oscillation mode . The extent of the procedure was determined by CT findings.The use of forceps in this group was kept to minimal. In conventional method, Messerklinger method described by Stammberger was done using conventional endoscopic sinus surgery instruments like forceps, curette .

The operative time was estimated from insertion of the vasoconstrictor nasal pack at beginning of surgery to insertion of the medicated nasal pack. At the end of surgery, the visibility and degrees of dryness of the operative field was determined by the surgeon as follows:

PER-OPERATIVE FIELD VISIBILITY

The surgical field visbility was graded accordingly:

BOEZAART VANDERMERWE GRADING

Grade 1 – Cadaveric conditions

Grade 2 – Field is good with infrequent suction required.

Grade 3 – Field is good only with frequent suctioning

Grade 4 – Field is not visible after removal of suction before the instrument can perform the task.

Grade 5 – Abandoning of surgery

POSTOPERATIVE CARE

The nasal pack was removed the next day after surgery.Intravenously Antibiotic was given during surgery and followed by oral antibiotics for one week. Douching with nasal saline and topical steroid spray were used till the nasal mucosa healed. Diagnostic nasal endoscopic was done every regular interval and finding noted. The post operative follow up was done a week after discharge and then every month for six months. postoperative follow up was done days 1,3, 10, 17 and 24 after surgery. VAS was analysed at 3, 6 month and values entered. The level of scarring , crusting, recurrence and synechiae were documented at each visit.

Post operative scoring system of Lund Kennedy:

1.Scarring, left (0,1,2)

2.Scarring right (0,1,2)

3.Crusting left (0,1,2)

4.Crusting right (0,1,2)

Scarring: 0-absent; 1-mild; 2-severe.

Crusting: 0-absent; 1-mild; 2-severe.

ANALYSIS OF DATA:

The data was entered into microsoft excel sheet and analysed using standard statistical packages. The tests used were measures of frequency, measures of central tendency(Mean and Median). Associations were tested using tests of significance like Chi square test and the independent sample t test

RESULTS

AGE DISTRIBUTION

S.NO	AGE GROUP	FREQUENCY	PERCENT
1	13-20	9	18%
2	21-30	14	28%
3	31-40	11	22%
4	41-50	8	16%
5	51-60	8	16%

Majority of the population lies in the age group 21-40years(50%)

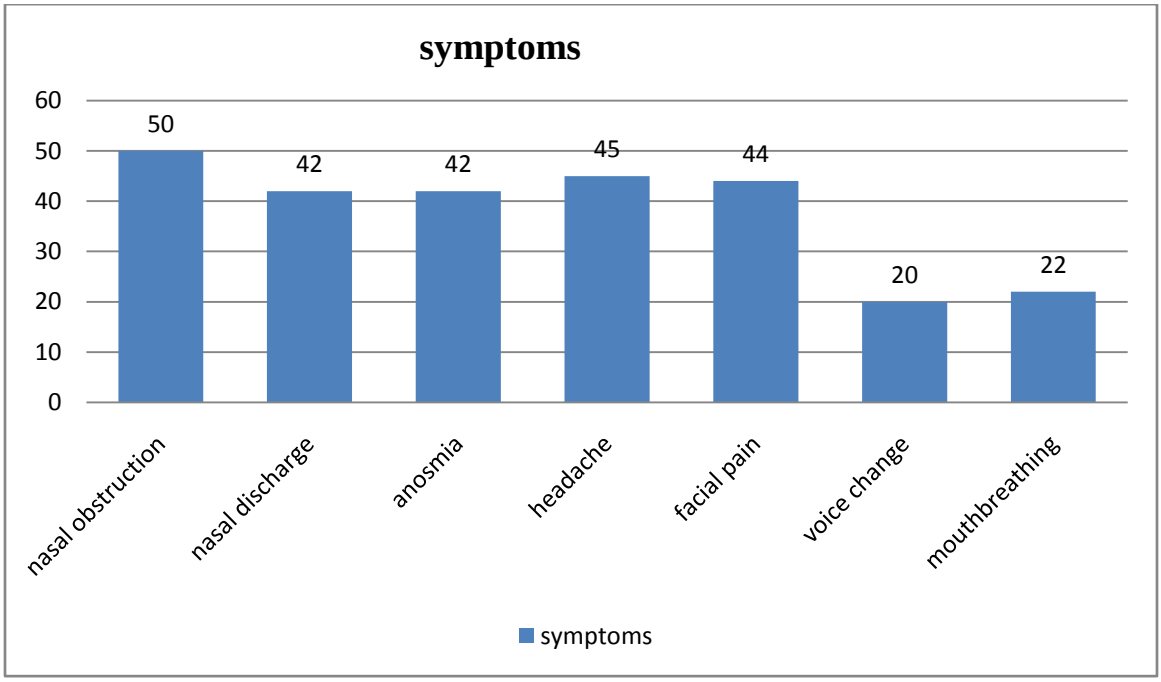
GENDER DISTRIBUTION

S.NO	GENDER	FREQUENCY	PERCENT
1	FEMALE	19	38%
2	MALE	31	62%
3	TOTAL	50	

Majority of population were males-62%

Female population -38%

SYMPTOMATOLOGY OF PATIENTS WITH NASAL POLYP



The bar above shows symptomatology of study subjects

The most common symptom was nasal obstruction(100%)

STAGE OF NASAL POLYP ON ENDOSCOPIC EXAMINATION (LUND MACKAY SCORE)

S.NO	STAGE OF NASAL POLYP	FREQUENCY	PERCENT
1	STAGE 2	18	36%
2	STAGE 3	32	64%
3	TOTAL	50	

Large population of the study were in the stage 3 of disease

PREOPERATIVE VISUAL ANALOGUE SCORE

S.NO	**Symptom**	**Minimum**	**Maximum**	**Mean**	**Std deviation**
1	**Facial pain**	3	9	7.12	1.365
2	**Headache**	6	9	8.36	0.898
3	**Nasal block**	6	9	8.40	0.756
4	**Discharge**	5	9	6.66	0.895
5	**Olfactory disturbance**	4	9	7.18	1.1713
6	**Total points**	24	45	37.68	2.924

Total preoperative minimum score was 24

Total preoperative maximum score was 45

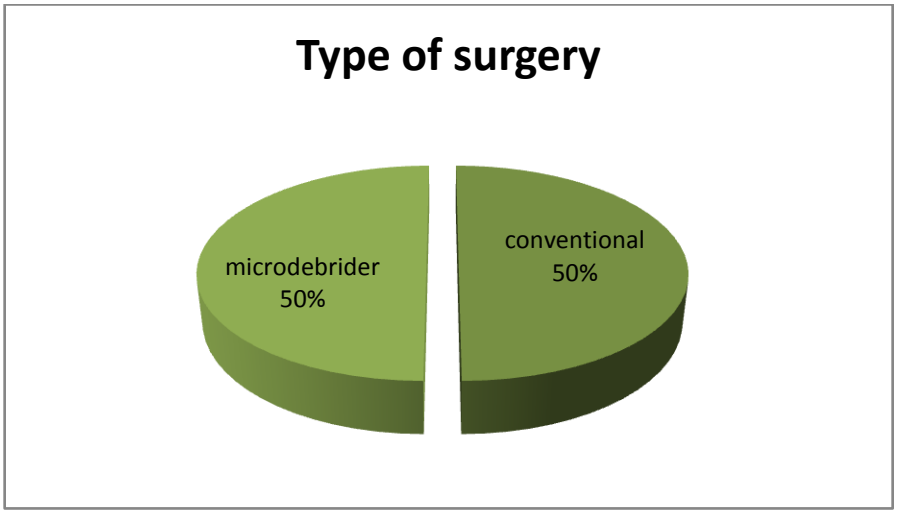
CT SCAN FINDING ACCORDING TO LUND MACKAY STAGING

S.NO	**Name of the sinus**	**Grade 0**	**Grade 1**	**Grade 2**	**Total**
1	Maxillary	0	15	35	50
2	Anterior ethmoidal	6	16	28	50
3	Posterior ethmoidal	15	21	14	50
4	Sphenoid	18	20	12	50
5	Frontal	19	22	9	50

Majority of Patient with maxillary sinus involvement had grade 2 (70%)

Anterior ethmiod sinus involvement grade 0 (12%),1(32%),2(56%)

TYPE OF SURGERY



Total patients-50

Treatment with microdebrider -25(50%)

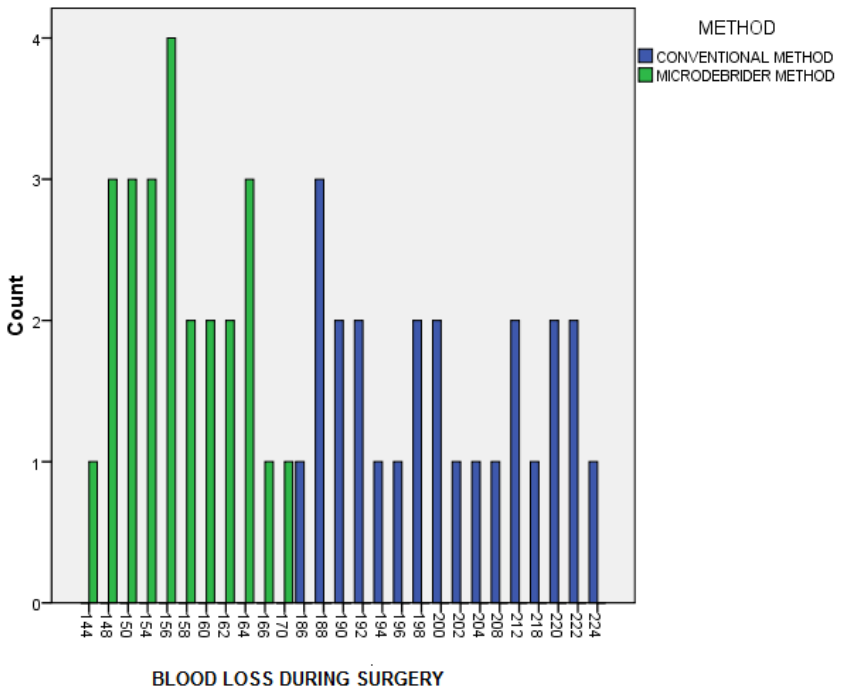
Treatment with conventional method -25(50%)

BLOOD LOSS DURING SURGERY

S.no	BLOODLOSS(ML)	MICRODEBRIDER	CONVENTIONAL	TOTAL
1	140-160	19	0	19
2	161-180	6	0	6
3	181-200	0	14	14
4	201-220	0	8	8
5	221-240	0	3	3
	TOTAL	25	25	50

Average blood loss in microdebrider- 156ml

Average blood loss in conventional - 203 ml



INTRAOPERATIVE VISIBILITY OF FIELD

(BOEZAART VANDERMERWE GRADING)

S.NO	Grade of blood loss	Frequency	Percent
1	**Grade 1**	0	0%
2	**Grade 2**	10	20%
3	**Grade 3**	22	44%
4	**Grade 4**	14	28%
5	**Grade 5**	4	8%
6	**TOTAL**	50	

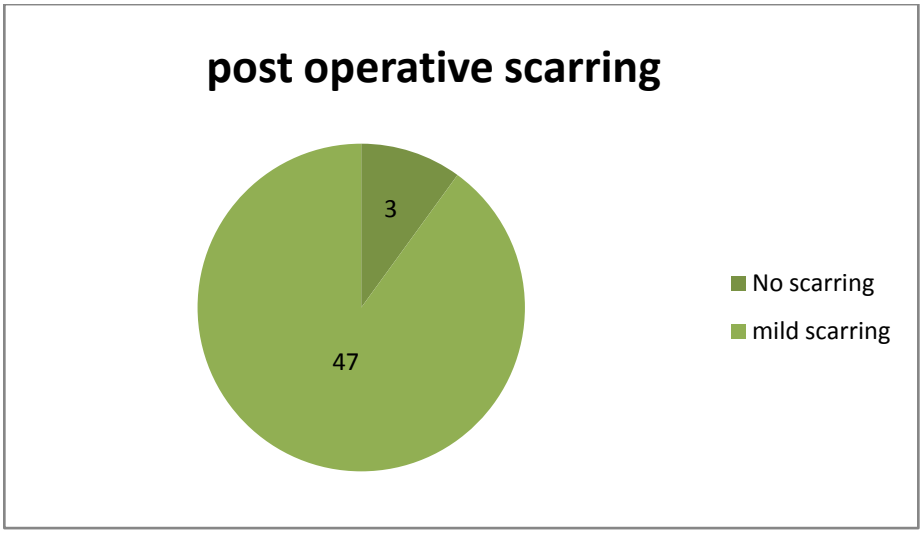
Majority of patient had grade 3 (44%), 28% had grade 4

TIME REQUIRED FOR SURGERY

S.NO	TIME FOR SURGERY(minutes)	FREQUENCY	PERCENT
1	80-90	12	24
2	91-100	13	26
3	101-110	5	10
4	111-120	4	8
5	121-130	13	26
6	131-140	3	6

Time taken for surgery was 80-100mts in 25(50%) and 121-130(26%)

POST OPERATIVE SCARRING



Post operative scarring seen in 47(94%) patients,3(6%) had no scarring

POST OPERATIVE CRUSTING

Post operative scarring	TYPE OF SURGERY		Total
	Conventional	**Microdebrider**	
Absent	0	0	0
Present	25	25	50
Total	25	25	50

Post operative crusting seen in all patients

POST OPERATIVE EDEMA

POST OPERATIVE EDEMA	FREQUENCY	PERCENT
Grade 0	0	0
Grade 1	50	100

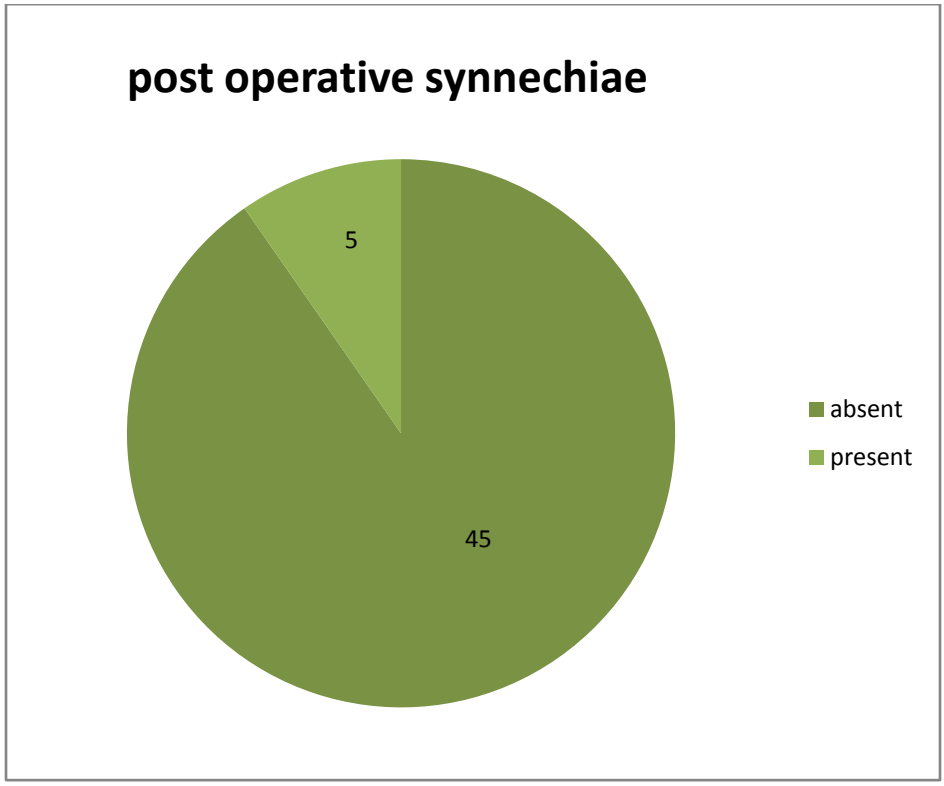
Post operative edema grade 1 was noted in all patients

POST OPERATIVE NASAL DICHARGE

POST OPERATIVE DISCHARGE	FREQUENCY	PERCENT
Grade 0	0	0
Grade 1	50	100

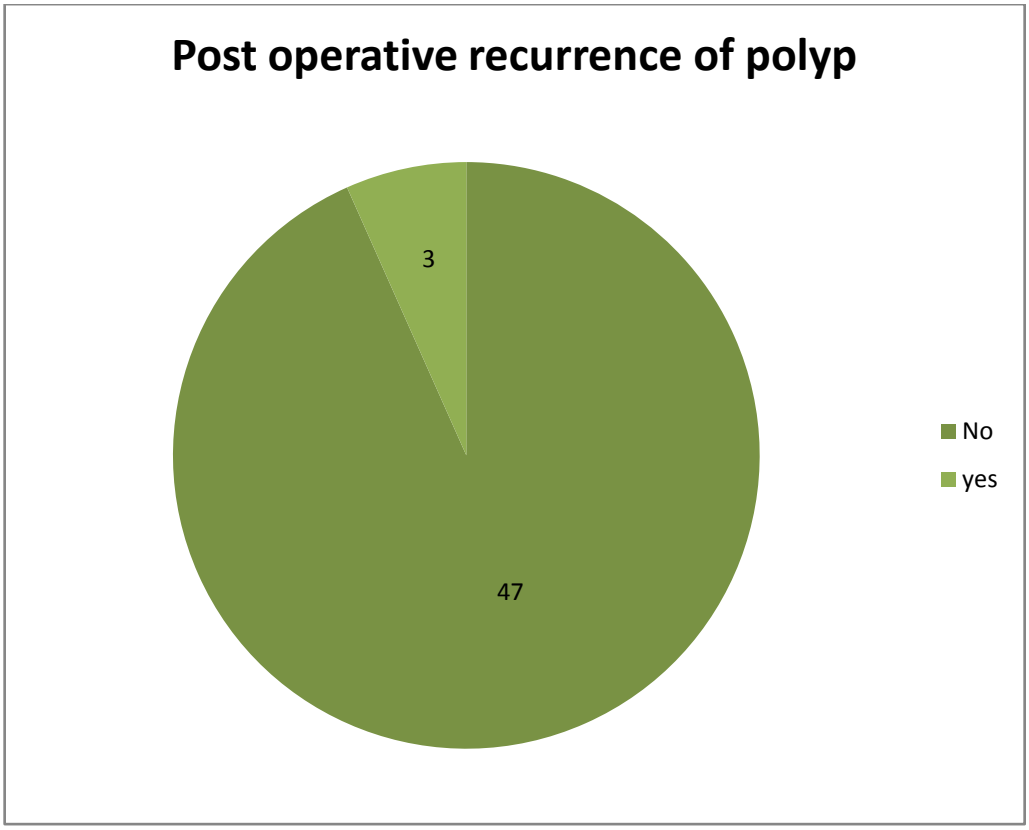
Post operative discharge grade 1was noted in all patients

POST OPERATIVE SYNECHIAE



Post operative synechiae seen in 5(10%) patients

POST OPERATIVE RECURRENCE OF POLYPS



Recurrence of polyp was seen in 3(6%) patients

3 MONTHS VISUAL ANALOGUE SCORE

S.NO	Symptom	Minimum		Maximum		MEAN		STD DEVIATION	
		C	M	C	M	C	M	C	M
1	**Facial pain**	1	0	3	3	1.64	1.04	0.569	0.889
2	**Headache**	1	0	4	3	2.12	1.08	0.833	0.954
3	**Nasal block**	1	3	4	3	2.24	0.92	0.970	0.812
4	**Discharge**	2	0	4	4	2.68	1.52	0.802	1.046
5	**Olfactory disturbance**	3	0	4	3	3.00	1.44	0.707	1.193
6	**Total points**	8	3	19	16	11.72	6.00	2.031	2.533

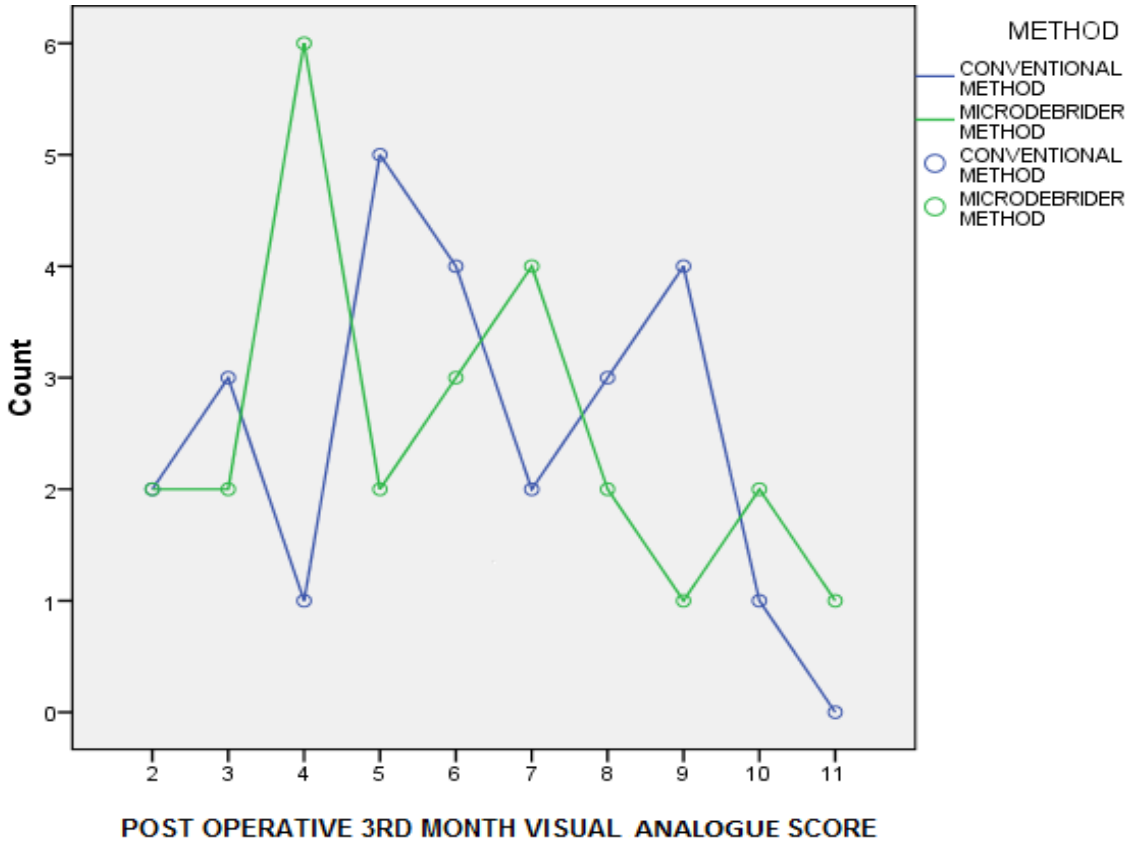
VSA Minimum score improved in MICRODEBRIDER(M)

VSA Maximum score improved in MICRODEBRIDER(M)

The mean score was least for facial pain (1.04) with microdebrider and facial pain (1.64) with conventional method.

The total score was 2.03 with microdebrider (M)and 6.00 with conventional (C)method.

3 MONTHS VISUAL ANALOGUE SCORE



6 MONTHS VISUAL ANALOGUE SCORE

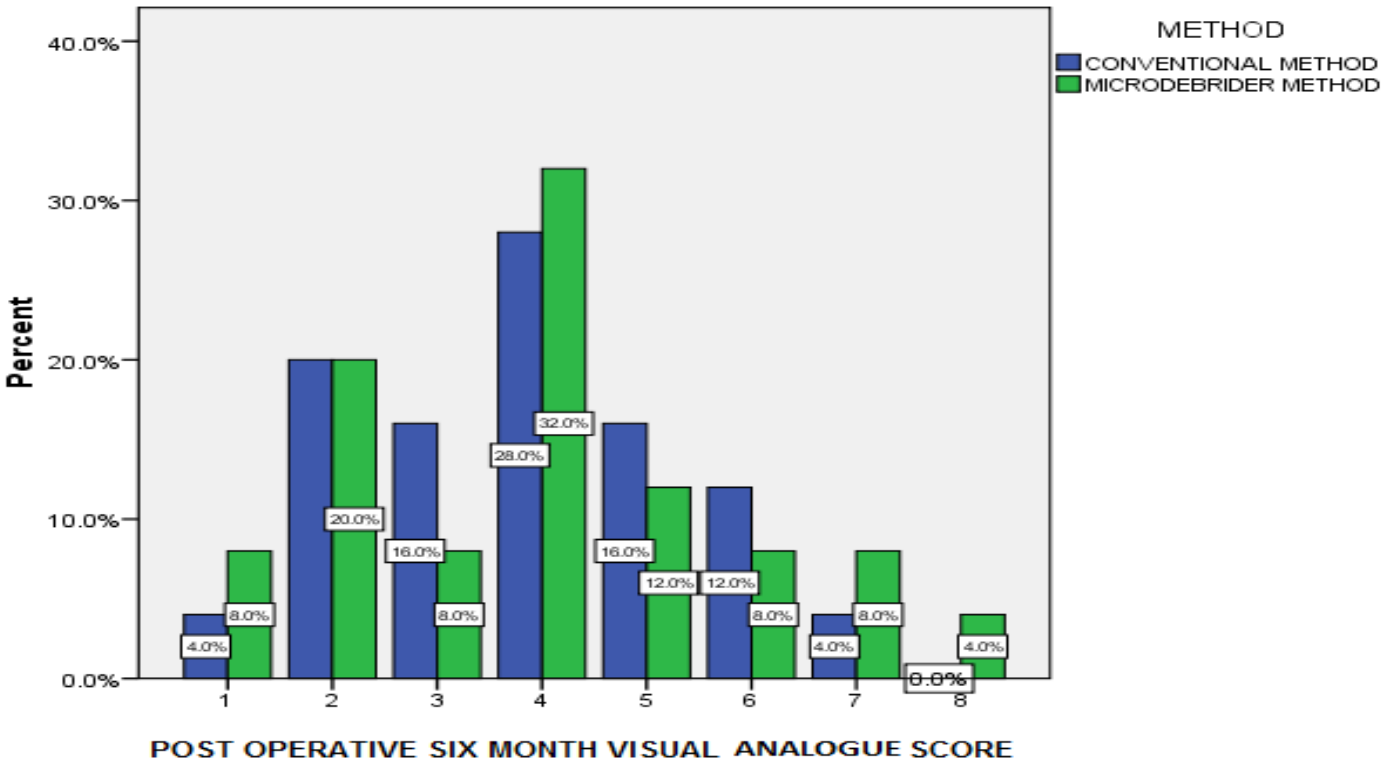
S.no	Symptoms	Minimum		Maximum		Mean		Std deviation	
		C	M	C	M	C	M	C	M
1	**Facial pain**	1	0	2	2	1.32	0.32	0.476	0.557
2	**Headache**	1	0	3	2	1.76	0.64	0.597	0.810
3	**Nasal block**	1	0	3	2	1.60	0.68	0.816	0.748
4	**Discharge**	0	0	3	2	2.08	1.00	0.640	0.645
5	**Olfactory disturbance**	1	0	3	3	2.32	1.32	0.627	0.945
6	**Total points**	4	0	14	11	9.04	3.96	1.399	1.881

VAS Minimum score improved in microdebrider/VAS Maximum score improved in microdebrider .

The mean score was least for facial pain (0.32) with microdebrider and facial pain (1.32) with conventional method.

The total score was 3.96 with microdebrider (M)and 9.04 with conventional (C)method.

6 MONTHS VISUAL ANALOGUE SCORE



TYPE OF SURGERY VERSUS TIME REQUIRED FOR SURGERY

S.NO	**Type of surgery**	MEAN
Time for surgery	**Conventional**	123.68minutes
Time for surgery	**Microdebrider**	92.33minutes

(p- 0.001)

The mean time of surgery in conventional type of surgery was - 123.68 minutes.

The mean time of surgery in microdebrider type of surgery was - 92.33 minutes.

BLOOD LOSS DURING SURGERY

	METHOD	MEAN(ml)	STD.DEV	P-VALUE
BLOOD LOSS DURING SURGERY	**MICRODEBRIDER METHOD**	**156.08**	**12.735**	**0.001**
	CONVENTIONAL METHOD	**202.56**	**6.615**	

(p- 0.001)

Average blood loss in microdebrider- 156.08ml

Average blood loss in conventional - 202.56 ml

TYPE OF SURGERY VERSUS SURGICAL FIELD VISIBILITY

Type of surgery	Grade 2	Grade 3	Grade 4	Grade 5	Total
Conventional	0	7	14	4	25
Microdebrider	10	15	0	0	25
Total	4	14	8	4	50

Chi - square value 30.909 (p- 0.001)

The surgical field visibility was significantly better among patients who were operated on microdebrider technique.

In conventional method 14 patients had grade 4 visibility and 7 patients had grade 3, 4 patient grade 5 visibility.

In micrdebrider method 15 patient had grade grade 3 visibility and 10 patients had grade 2 visibility.

TYPE OF SURGERY VERSUS POST OPERATIVE SCARRING

Postoperative scarring	TYPE OF SURGERY		Total
	Conventional	**Microdebrider**	
Absent	1	2	3
Present	24	23	47
Total	25	25	50

Chi – square value 0.355 (p - 0.552)

There is no significant difference in the rate of occurrence of post operative scarring among both the methods of surgery.

Two patients had post operative scarring with conventional method and one patient with microdebrider method.

TYPE OF SURGERY VERSUS POST OPERATIVE SYNECHIAE FORMATION

Synechiae	TYPE OF SURGERY		Total
	Conventional	**Microdebrider**	
Absent	20	25	45
Present	5	0	5
Total	25	25	50

(p-0.016)

Chi – square value 5.05

5(10%) Patients operated with conventional method showed synechiae formation

TYPE OF SURGERY VERSUS POST OPERATIVE RECURRENCE OF POLYP

Recurrence of polyp	TYPE OF SURGERY		Total
	Conventional	**Microdebrider**	
Absent	23	24	47
Present	2	1	3
Total	25	25	50

Chi – square value -0.355 (p- 0. 552)

2(4%) Patients operated with conventional method showed recurrence of polyp. In microdebrider method one patient had recurrence.

COMPARISON BETWEEN VAS AT 3 AND 6 MONTHS WITH TYPE OF SURGERY

Total score	Type of surgery	Mean	Std. Deviation	Std. Error mean	p-value
VAS at 3 months	Conventional	**11.72**	**2.031**	**0.406**	**0.001**
	Microdebrider	**6.00**	**2.533**	**0.507**	
VAS at 6 months	Conventional	**8.52**	**1.982**	**0.306**	**0.001**
	Microdebrider	**4.36**	**2.498**	**0.500**	

1)An independent sample t test showed a significant difference in the mean visual analogue score at 3 months following surgery in patients who were treated with microdebrider technique.

2)A t test did not showed a significant difference in the mean visual analogue score at 6 months following surgery in patients who were treated with microdebrider technique.

DISCUSSION

The findings have been discussed under the following headings:

1. Demographic details of the study population

2. Details of preoperative symptoms, intra operative findings and postoperative recovery over a period of 6 months

DEMOGRAPHIC DETAILS OF THE STUDY POPULATION:

Age distribution:

In the present study maximum study population were in the age group of 13 to 20 and 21 to 30years who constituted of population 18% and 28% respectively,followed by 31 to 40 and 41 to 50 years who formed 22% and 16% respectively. 16% of population were in age between 51-60 years.

Gender distribution:

Out of the 50 patients 31 were males (62%) and 19(38%) were females. According to the epidemiological analysis by Bettiga et al men are more commonly affected with polyps (41.66%) which is in accordance with this study.[43]

Clinical profile of study patients:

Incidence of preoperative symptoms:

In the present study nasal obstruction was the most common symptom that affected 100% of patients followed by headache and facial pain being present in 90% and 84%respectively. Nasal discharge or anterior rhinorrhoea and anosmia was reported by 88%of patients. Mouth breathing and voice change was seen in 44% and40% patient respectively.[43]

Stage of nasal polyp on clinical examination

Among 50 patients 32(64%) were found to be having Stage III disease while 18(36%) had Stage II disease. Clinical staging of the Nasal polyp from grade I to III (I = polyps limited to the middle meatus, II = polyps extending beyond the middle meatus, and III = polyps occupying the entire nasal cavity.

Pre and postoperative comparison of Visual Analogue Scale

The minimum VAS score 24 and maximum score was 45 .VAS improved to 8 and 19 in conventional cases,but with the score improved to 3and16 three months after surgery. In 6 months it improved to 4 and 14 in conventional method and with

microdebrider it improved 0 and 11 .[44,45] VAS improved better with microdebrider method and was statistically significant.

CT Scan findings:

Lund and Mackay score was used to grade sinonasal poylposis. Majority of the patients in the study had maxillary sinus involvement with total opacification of sinus of Lund Mackay Grade 2.[46,47]

COMPARISON OF INTRAOPERATIVE PARAMETERS:

Intraoperative visibility of surgical field

In this study the preoperative visibility was graded according to BOEZAART VANDERMERWE grading .In our study 44% of patients had grade 3 bleeding .Grade 4 bleeding was seen in 28% . Grade 2 bleeding was seen in 20%. The visibility of operative field was better in debrider method compared to conventional instrument method .

Intraoperative blood loss:

In our study average blood loss with microdebrider was 156.08ml and an average 202.56 ml of in conventional cases.

In a study by Christmas et al on patients who underwent microdebrider assisted surgery and conventional endoscopic method. A blood loss of 19.5ml was seen with debrider method and in conventional method 44.5ml. Thus, bleeding during surgery was decreased in the microdebrider method.[50] RSingh et al also in his study of 40 patients found that the amount of intraoperative bleeding in the microdebrider method was 181 ml, compared with 225ml in conventional methods.[48]

Kumar and Sindwani demonstrated in their study that bipolar microdebrider significantly decreased intra operative blood loss and duration of surgery in nasal polyposis.[49]

Time required for surgery:

In this study mean time required for surgery was in debrider group(92.33minutes) when compared to conventional methods(123.63minutes). The shorter operating time is due to suction of tissues and blood by microdebrider concurrently, which offers a improved bloodless field and better visibility, when compared to conventional instruments which needed longer time to control bleeding. The prospective study by Saafan et al also showed same results.[50]

In the study by R Singh et al the average duration of surgery was 55 minutes in microdebrider method, compared with 64 minutes in the conventional method which was not statistically significant.

COMPARISON OF POSTOPERATIVE OUTCOME:

In this study the post operative scarring was seen 27(90%) patient and was absent in 3 patient .Five(10%) patients showed post operative synechiae . Recurrence was seen in 3(6%) patients.In postoperative course five patients treated with conventional method had synechiae and two patients had recurrence.In microdebrider method one patient had recurrence and no synechiae formation. Post operative edema(grade1) and discharge(grade1) was seen all patients. Synechiae formation in FESS is upto 27% .[51,53] Synechiae is created when there is mucosal contact during the healing . Synechiae is common between the lateral nasal wall and middle turbinate . Minimal tissue trauma and avoiding mucosal damage are important to minimize scarring and this is offered by microdebrider. Stankiewicz noted synechiae in 6.7% of his patients.[51]

Lazar et al noted a synechiae formation in 513 adults patients was 27% and a 20% rate in 260 children.[52]Gaskins reported an scarring incidence of 10.5%, with 4.1% of 970 endoscopic procedures requiring revision surgery because of major scar formation and obstruction.[53] Setliff and Parsons in 345 patients showed, and decreased middle turbinate trauma reduced synechiae with microdebrider method.[54]

Bernstein et al. reported in 40 patients who under went endoscopic sinus surgery with the microdebrider noted a low rate of synechiae formation, rapid mucosal healing.[55] Christmas and Krouse study showed that endoscopic sinus surgery with

microdebrider observed that no synechiae were seen in the debrider method , whereas four patients in the conventional method had synechiae.[56] The microdebrider requires experience and skill. Bhatti and colleagues have described microdebrider can cause injury to lamina papyracea. A small deficiency in the lamina papyracea can pull through orbital fat or even extra-ocular muscles into the microdebrider suction.Few cases in which CSF fistula ,subarachnoid haemorrhage have been reported .[57]

Recent developments are the coblator, suction-irrigation drill. The main disadvantage of microdebrider is the higher costs, but advantage is the capacity to do many functions, such as suction, irrigation and removal of bone at a time The Development in microdebrider machinery permits 360 degree blade rotation, instrument tracking with surgical navigation, and the capability to control bleeding with bipolar energy. Different types of blades are also available, each for a particular operative limitation encountered during FESS.[58]

Complete knowledge of endoscopic paranasalsinus anatomy, a bloodless operating field, and observing colour change during surgery, surgical experience, are the prerequisites for lowering the complications . Microdebrider lowers the rate of complications, even in high-risk cases such as sinonasal polyposis[5].

CONCLUSIONS

1. Age of the patients suffering from unilateral or bilateral nasal polyps ranged from13 to 60 years with the mean age of 35years.

2. Nasal polyps were most commonly seen affecting men out numbering women in a ratio of almost two is to one.

3.In both methods VAS after surgery showed difference. There was statistically considerable difference between microdebrider assisted endoscopic sinus surgery and the conventional method in total VAS score at 3 months and 6 months postoperatively

4. The operative time in the microdebrider method was much short when compared to the conventional method.

5. The surgical field visibility were considerably better in microdebrider method compared to conventional method.

6.There was no complications in both the method. In postoperative course there was considerable statistical difference between the two methods with respect to the outcomes synechiae formation . Postoperative recurrence and scarring in both methods did not have considerable statistical difference.

7.In postoperative course there was no significant statistical difference between the two method with respect to the outcomes like post operative edema , discharge.

8.The use of microdebrider in endoscopic sinus surgery has the advantage of complete clearance of disease, smoother intra operative course and better post operative healing when compared to conventional instruments in the treatment of nasal polyps.

PROFORMA

Name :

Age & Sex :

Occupation :

OP / IP No :

History :

Complaints
1.
2.
3.
4.
5.

H/o Allergy
Food / Inhalant
Seasonal / Perennial

Past History:
1. Hypertension
2. Diabetes Mellitus
3. Bronchial Asthma
4. Bleeding disorders

Treatment History:

1. Antibiotics
2. Anti Histamines
3. Steroids – Systemic / Intra nasal

4. Decongestants – Systemic / Topical
5. Aspirin / NSAIDs & others
   H/o previous surgery / Anaesthesia

Clinical Examination:
Nose:
1. Anterior Rhinoscopy
2. Posterior Rhinoscopy
3. Para Nasal Sinus Tenderness
4. Cold Spatula Test

Ear and Throat examination

SYSTEMIC EXAMINATION:

CVS	CNS
RS	P/A

INVESTIGATIONS

Complete haemogram
Random blood sugar, Blood urea, Serum creatinine
Urine –albumin /sugar

Pre Operative Diagnostic Nasal Endoscopy:

CHARACTERISTIC	Right	Left
I PASS		
II PASS		
III PASS		
POLYPS GRADES		

0 = Absence of polyps; 1 = polyps in middle meatus only;

2 = polyps beyond middle meatus but not blocking the nose completely;
3 = polyps completely obstructing the nose

CT Scan – Para Nasal Sinuses

Lund-MacKay scoring system: CT scoring system

SINUS SYSTEM	RIGHT	LEFT
Maxillary (0,1,2)		
Anterior ethmoids (0,1,2)		
Posterior ethmoids (0,1,2)		
Sphenoid (0,1,2)		
Frontal (0,1,2)		
Ostiomeatal complex (0 or 2 only)*		
Total points		

0 = no abnormalities; 1 = partial opacification; 2 = total opacification
*0 = not occluded, 2= occluded

ASSESSMENT OF SYMPTOMS BY VISUAL ANALOGUE SCALE FROM 1 TO 10 :

Nasal block
Nasal discharge
Olfactory disturbance
Headache
Facial pain

FESS by Conventional methods using instruments or using Microdebrider

Measurement of intra operative blood loss, visibility of surgical field and the time required for surgery

Post operative follow up of patients 1, 3, 10, and 24, 3 and 6 months

Grading of postoperative scarring, crusting, and by Lund and Mackay staging; look for synechiae and recurrence of polyp

Symptom score by Visual analogue scale at 3 and 6 months.

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9

MASTER CHART

MASTER CHART

A	B	C	D	E	F	G	H		I	J	K	L	M	N	O	P	Q	R	S	T
1	JAYAGOPI	29	M	102914	35	3	12	12	M	164	96	3					5	4	1	1
2	IMTIYAZ	49	M	104155	30	2	10	10	C	190	130	4		1			12	8	1	1
3	KUMAR	50	M	103781	35	3	12	12	C	220	110	4	1	1	☆		14	10	1	1
4	NAGAIAH	29	M	104944	40	3	10	10	M	150	92	2		1			10	6	1	1
5	SUBHASHINI	30	F	105207	37	2	12	12	C	186	120	3		1			12	9	1	1
6	SADIQ	25	M	4569	41	3	12	12	M	144	88	2		1			3	2	1	1
7	HEMALATHA	39	F	109550	33	3	10	10	M	150	90	2		1			4	2	1	1
8	SUNIL	43	M	113051	34	3	12	12	M	156	96	2		1			5	2	1	1
9	SUBRAMANI	45	M	15488	36	3	10	10	C	198	130	3	1	1			10	8	1	1
10	SUNDRAMOORTHY	28	M	16058	39	2	12	12	M	148	102	3		1			11	7	1	1
11	VETRISELVAN	42	M	2481	40	3	10	10	C	212	118	4		1	☆		15	11	1	1
12	VELAYUTHAM	57	M	4803	34	3	12	12	M	154	82	2		1			3	2	1	1
13	ARUMUGAM	20	M	10806	38	2	12	12	C	188	116	3		1		+	9	8	1	1
14	NANDHINI	19	F	10032	39	3	12	12	C	204	126	4		1			11	10	1	1
15	GAUTHAMI	16	F	12036	40	3	10	10	C	222	128	3		1			13	9	1	1
16	GOPINATH	46	M	13042	42	3	10	10	M	158	98	1		1			2	1	1	1
17	RAMDOSS	57	M	13164	37	3	12	12	M	160	96	2		1			4	2	1	1
18	FOWZYA	25	F	32694	34	3	10	10	C	218	106	3		1			9	7	1	1
19	SARAVANAN	33	M	34492	41	2	12	12	C	192	104	4	1	1			14	9	1	1
20	PRABHAKAR	18	M	34220	38	3	12	12	M	162	86	2		1			8	4	1	1
21	SARADHA	48	F	34999	42	2	10	10	M	150	80	2		1			6	4	1	1
22	SHAKILA	28	F	35456	38	3	12	12	C	202	126	4		1			10	8	1	1
23	MUTHULAKSHMI	30	F	1300123	40	2	12	12	M	154	90	3		1			7	4	1	1
24	BALASUBRAMANI	23	M	6288	40	3	12	12	C	208	130	4		1		+	16	12	1	1
25	ADHISESHAN	20	M	39876	36	2	12	12	C	188	124	3		1			13	9	1	1
26	PADMA	40	F	1312482	40	3	10	10	C	200	110	4		1			11	8	1	1
27	CHINNAPAN	60	M	2345	35	2	10	10	M	156	94	2		1			2	1	1	1
28	MARESHWARI	29	F	10387	39	3	12	12	C	224	90	4		1			9	6	1	1
29	RASIQ	51	M	11974	40	3	10	10	M	160	90	1		1			6	4	1	1
30	MURUGAN	27	M	14132	39	3	12	12	M	166	98	2		1			9	5	1	1

A	B	C	D	E	F	G	H	H	I	J	K	L	M	N	O	P	Q	R	S	T
31	VINITHA	17	F	491	35	3	10	10	M	164	96	3					7	7	1	1
32	SIBI	19	M	649	32	3	12	12	M	170	98	3		1			7	5	1	1
33	PALANI	40	M	6432	38	2	10	10	C	220	130	4	1	1	☆		15	10	1	1
34	MOHAN	28	M	11167	41	3	10	10	C	200	134	3		1	☆		12	11	1	1
35	KANIMOZHI	32	F	10451	35	2	12	12	C	196	120	3		1			13	10	1	1
36	VISALATCHI	44	F	5358	40	2	10	10	M	164	88	2		1			4	4	1	1
37	VENKATRAJ	15	M	13237	34	3	12	12	C	190	124	3		1			10	6	1	1
38	SEKAR	53	M	17444	35	2	12	12	M	156	96	2		1			6	8	1	1
39	KALAIVANI	35	F	20011	37	3	10	10	C	198	130	4	1	1			11	4	1	1
40	GUNA	51	F	20192	40	2	12	12	M	148	90	3		1			10	10	1	1
41	SELVI	37	F	23575	42	3	10	10	C	212	138	4		1			11	8	1	1
42	SUMATHY	40	F	24962	35	3	10	10	M	154	82	2		1			8	10	1	1
43	VEERAMANI	24	M	10806	40	2	12	12	C	188	126	4		1			9	4	1	1
44	KANNAN	60	M	1318238	38	3	10	1	M	156	86	2		1			4	3	1	1
45	HARI	22	M	987148	41	3	10	10	C	222	128	3		1	☆		12	10	1	1
46	BHUVANA	37	F	987036	40	2	12	12	M	158	98	2		1		+	4	3	1	1
47	GOVINDASWAMY	35	M	984456	38	3	12	12	C	194	128	4		1			10	9	1	1
48	MALLIGA	56	F	982188	33	3	10	10	M	148	100	3		1			8	5	1	1
49	SOMASUNDARAM	34	M	980613	40	2	10	10	M	162	94	2		1			7	4	1	1
50	DURGA PRASAD	18	M	978196	38	3	12	12	C	192	136	4	1	1			12	9	1	1

KEY TO MASTER CHART

A- S.NO
B- NAME
C- AGE
D- SEX
E- IP NO

F- PRE OPERATIVE VISUAL ANALOGUE SCORE

G- DIAGNOSTIC NASAL ENDOSCOPY POLYP GRADE

H-CT SCORE –LUND &MACKAY METHOD

I - M-MICRODEBRIDER, C-CONVENTIONAL METHOD

J- BLOOD LOSS DURING SURGERY

K- DURATION OF SURGERY

L- VISIBILITY DURING SURGERY

M- POST OPERATIVE SCARRING

N- POST OPERATIVE CRUSTING

O- POST OPERATIVE SYNECHIAE( ) ☆

P- POST OPERATIVE RECCURENCE(+)

Q- POST OPERATIVE 3^{RD} MONTH VISUAL ANALOGUE SCOR

R- POST OPERATIVE 6^{RD} MONTH VISUAL ANALOGUE SCORE

S- POST OPERATIVE EDEMA

T- POSTOPERATIVE DISCHARGE

ANNEXURE

ABBREVIATIONS

1) cAMP- CYCLIC ADENOSINE MONOPHOSPHATE
2) CFTR- CYSTIC FIBROSIS TRANSMEMBRANE REGULATOR
3) CT – COMPUTED TOMOGRAPHY
4) ECM-EXTRACELLULAR MATRIX
5) FESS-FUNCTIONAL ENDOSCOPIC SINUS SURGERY
6) MMP- METALLOPROTEINASE
7) NO-NITROUS OXIDE
8) NSAID-NON STEROIDAL ANTI INFLAMMATORY DRUG
9) OPD -OUT PATIENT DEPARTMENT
10) TIMP-TISSUE INHIBITOR OF METALLOPROTEINASE
11) VAS-VISUAL ANALOGUE SCORE
12) PG –PROSTAGLANDIN
13) IgE-IMMUNOGLOBLIN
14) RANTES-REGULATED AND NORMAL T CELL EXPRESSED AND SECRETED
15) PCD-Primary ciliary dyskinesia

PATIENT CONSENT FORM

Study Detail: **COMPARATIVE STUDY OF MICRODEBRIDER AND CONVENTIONAL INSTRUMENTS IN ENDOSCOPIC SINUS SURGERY FOR SINONASAL POLYPOSIS**"

Study Centre : kilpauk medical college and hospital

Patient Name :

Patient Age :

Identification Number :

Patient may tic ( ) these boxes

I confirm that I have understood the purpose of procedure for the above Study. I have the opportunity to ask the question and all my questions and doubts have been answered to my satisfaction. ☐

I understand that my participation in the study is voluntary and that I am free to withdraw at anytime without giving any reason, without my legal rights being effected. ☐

I understand that Investigator, Regulatory authorities and the Ethics committee will not need my permission to look at my health records both in respect to the current study and any further research that may be conducted in relation to it, even if withdraw fro the study. ☐

Iunderstand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from the study. ☐

I agree to take part in the above study and to comply with the instructions given during the study and faithfully co operative with the study team and to immediately inform the study staff if I suffer from any deterioration in my health or well being or any unexpected or unusual symptoms, ☐

I hereby con sent to participate in this study. ☐

I hereby give permission to undergo complete clinical examination and diagnostic tests including hematological, biochemical, radiological tests. ☐

Signature/Thumb Impression:

Place Date

Patient Name and Address:

Signature of the Investigator:

Place Date

Study Investigator's Name: